VAR4 / VAR12 / VAR20
DSP Audio Router

Product Description

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This equipment is designed and manufactured to conform to the following EC standards:

EMC EN55103-1/E1, EN55103-2/E5, EN50121-4, ENV50204

Safety EN60065

Failure to use the equipment in the manner described in the product literature will invalidate the warranty.

A 'Declaration of Conformity' statement to the above standards, and a list of auxiliary equipment used for compliance verification, is available on request.

This product must be disposed of in accordance with the WEEE directive.

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Contents

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03	V4.1.0470: CR0450-1494: Induction Loop CR0450-1496: Selectable Test Tone Corrections and updates	13/12/07

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1 Introduction

This document gives an overview on the application, features, interfaces, and functions of the ASL family of DSP-based Audio Router and Voice Alarm System controllers: the VAR4, VAR12 and VAR20. They are referred to generically as ‘VAR Router’ in this document. This document contains no definite instruction for action:

- The operation is described in the Operation Manual.
- The installation is described in the Installation Guide.

The document is intended for the use of technical readers who have an understanding of Voice Alarm Systems and who are trained in general electronics.

2 System Overview

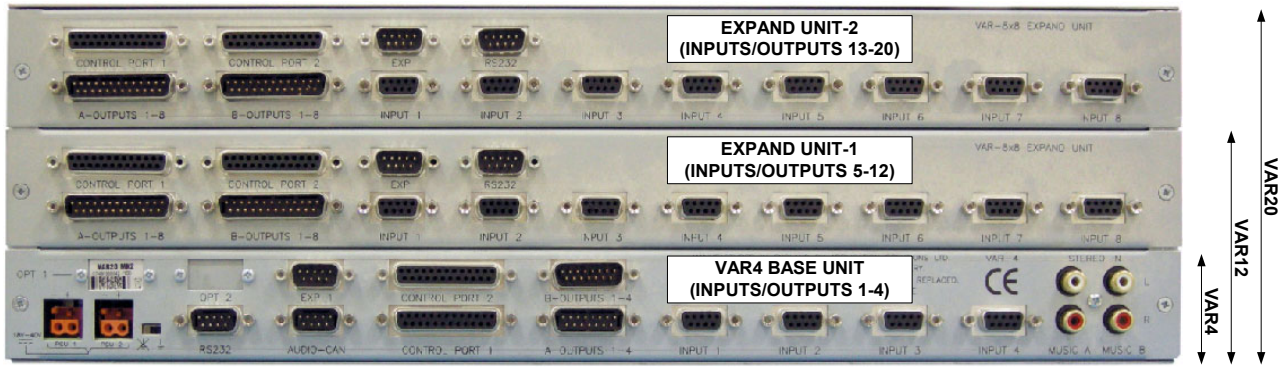
The VAR4, VAR12 and VAR20 are advanced DSP-based Audio Router and Voice Alarm System Controllers. They allow connection of 4, 12 or 20 audio inputs, which can be routed to 4, 12 or 20 outputs. Additionally they can monitor and control up to 63 Amplifier Mainframes (V400) and associated amplifier interface card/surveillance units. Each mainframe connects to the VAR Router via an Audio-CAN™ serial data network and audio monitor bus.

The digital messages may be routed flexibly under the control of the built-in Fire Panel Interface.

The VAR Router comprises a base unit and a number of expand units depending on its capacity as shown in Figure 1:

- VAR4: VAR4 Base Unit
- VAR12: VAR4 Base Unit + Expand Unit
- VAR20: VAR4 Base Unit + 2 Expand Units

Figure 1 VAR Router Units – Rear View



The VAR4 Router includes:

- Digital storage for 2 x 32-second messages and 2 x 16-second messages.
- Four universal Mic/Line inputs, each of which supports a serial interface to enable an ASL multi-zone Paging Microphone to be connected.

  All-Call or Zoneable Fire Microphones may be connected to Inputs 1 and 2. These act as All-Call failsafe override microphones in the event of processor failure as required by BS5839 Part 8.
- Four A&B audio outputs.
- Two connections for background music sources, either of which can be selected for routing.
- Built-in fire alarm interface:
  - 10 non-isolated analogue interfaces.
  - 12 opto-isolated interfaces.

The VAR12 Router includes:

- Digital storage for 4 x 32-second messages and 4 x 16-second messages.
- Twelve universal Mic/Line inputs, each of which supports a serial interface to enable an ASL multi-zone Paging Microphone to be connected.

  All-Call or Zoneable Fire Microphones may be connected to Inputs 1 and 2. These act as All-Call failsafe override microphones in the event of processor failure as required by BS5839 Part 8.
- Twelve A&B audio outputs.
- Two connections for background music sources, either of which can be selected for routing.
- Built-in fire alarm interface:
  - 10 non-isolated analogue interfaces.
  - 32 opto-isolated interfaces.

The VAR20 Router includes:

- Digital storage for 6 x 32-second messages and 6 x 16-second messages.
- Twenty universal Mic/Line inputs, each of which supports a serial interface to enable an ASL multi-zone Paging Microphone to be connected.

  All-Call or Zoneable Fire Microphones may be connected to Inputs 1 and 2. These act as All-Call failsafe override microphones in the event of processor failure as required by BS5839 Part 8.
- Twenty A&B audio outputs.
- Two connections for background music sources, either of which can be selected for routing.
- Built-in fire alarm interface:
  - 10 non-isolated analogue interfaces.
  - 52 opto-isolated interfaces.

Three VA system controller modes are provided:

- Configuration Mode: to commission and configure the system.
- Test Mode: to initiate and control a number of unit and system test.
- Fault Monitor Mode: to act as a comprehensive fault display.
- Audio Monitor Mode: to monitor the audio output of any input signal, DVA message or amplifier output, via both the built in loudspeaker and LCD display.

The VAR Router front panel provides a menu-driven interface and contains keys used to navigate the menus. Alteration of the VAR Router, amplifier and surveillance settings is controlled by access code.

The VAR Router products support a dial-in diagnostic interface allowing interrogation of fault status from a remote site. Because all parameters are controlled digitally, it is also possible to adjust routing and audio parameters remotely.

A VAR-NIA Network Interface Adapter provides the VAR12 and VAR20 with networking capability. The VAR-NIA interfaces the VAR12 or VAR20 to an Intellevac Network, enabling announcements and DVA messages broadcast from an Intellevac Network's Audio Control Unit (ACU) or any microphone connected to it. The Intellevac Network is the solution for large sites, where the VAR Routers can be networked to form multiple equipment room installations. For details on the Intellevac Network refer to the Intellevac [Table 8-7], or VAR8-ACU documentation [Table 8-6]. For details on the VAR-NIA, refer to the VAR-NIA Product Manual [Table 8-5].

2.1 System Context

The diagram in Figure 2 shows the VAR Router in system context. A number of audio inputs feed the VAR Router. Typically, these include ASL DMS-series paging microphone stations, ASL FMS-series Emergency Fireman's microphones (All-Call or Zoneable) and various background music sources. The function of the VAR Router is to connect these sources, as required to a number of audio outputs, which, in turn, feed power amplifiers and loudspeakers.

Additionally the VAR Router contains Digital Voice Announcers (DVAs). These are controlled by the Fire Alarm Panel to broadcast Alert or Evacuate messages to the building.

Figure 3 shows an example of VAR12 and VAR20 Routers connected to an Intellevac Network via a VAR-NIA Network Interface Adapter. The Audio Control Unit in this example is a wall mount Intellevac ACU.

Figure 2 VAR Router in System Context

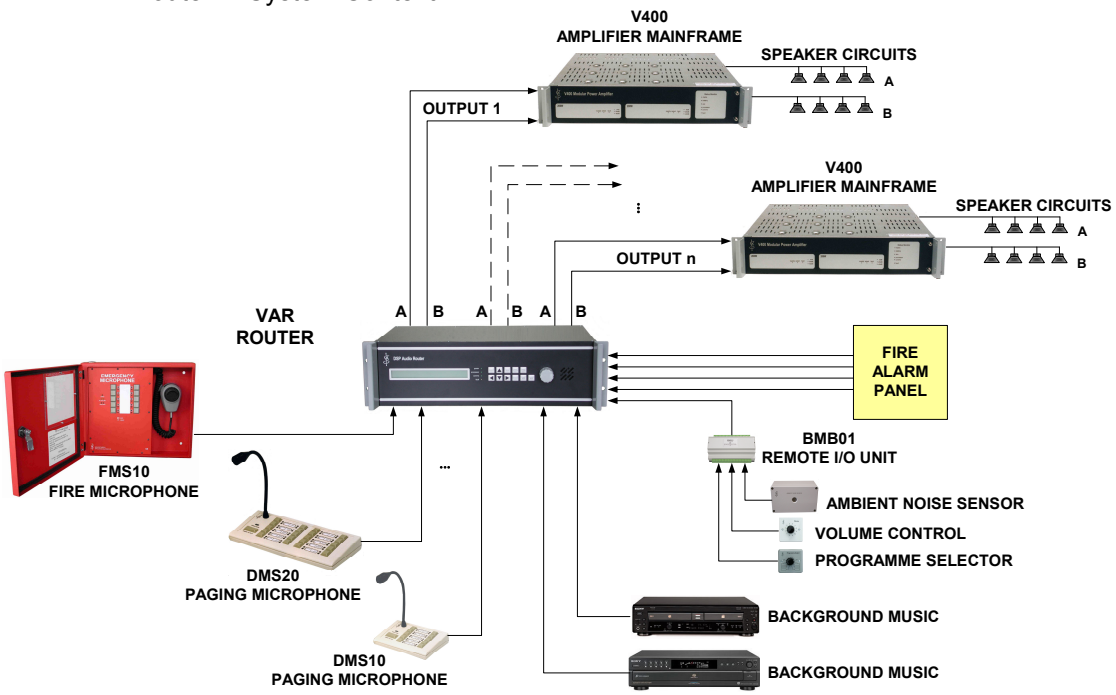
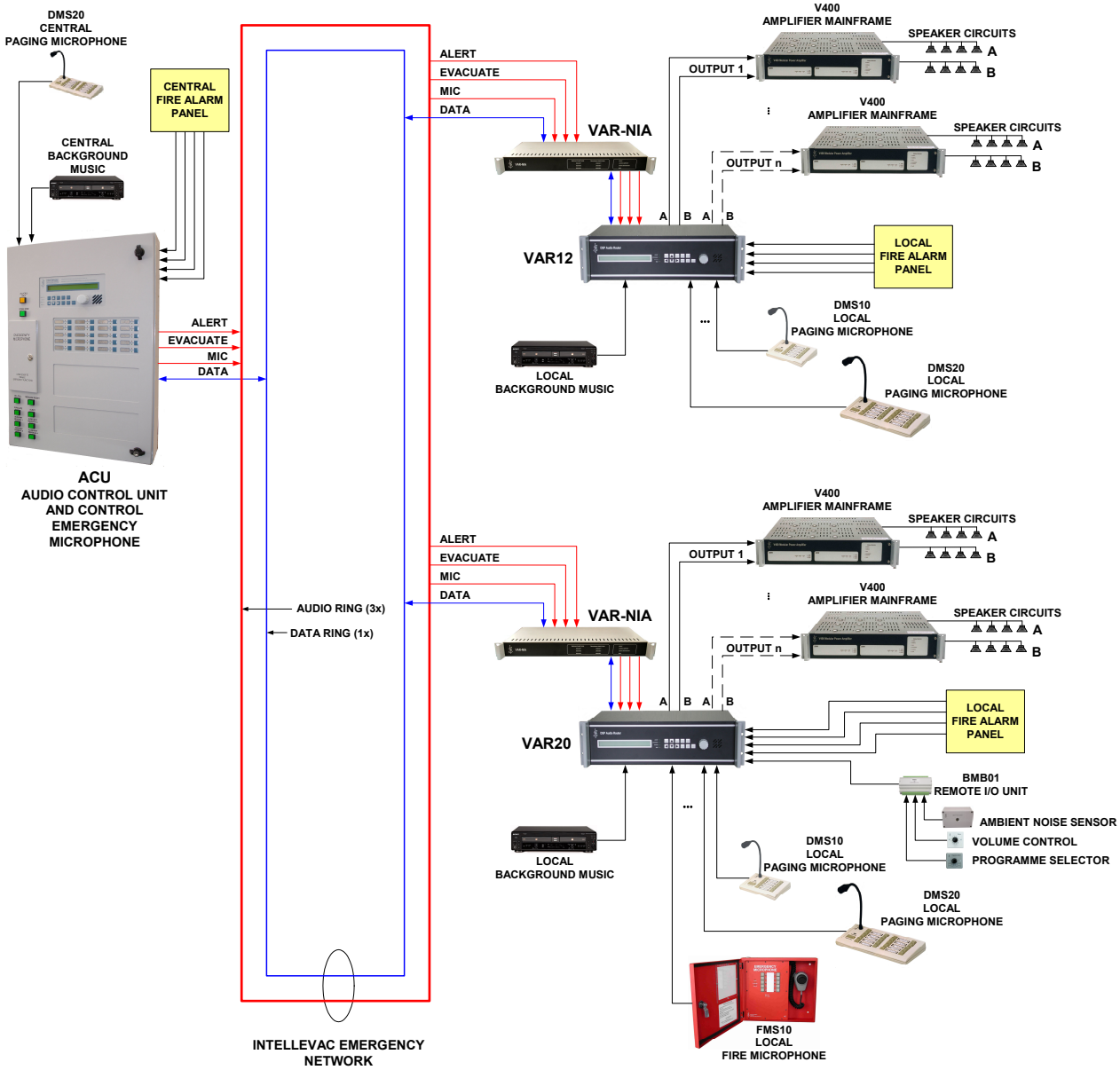


Figure 3 VAR12/20 Router Network Application with Intellevac ACU



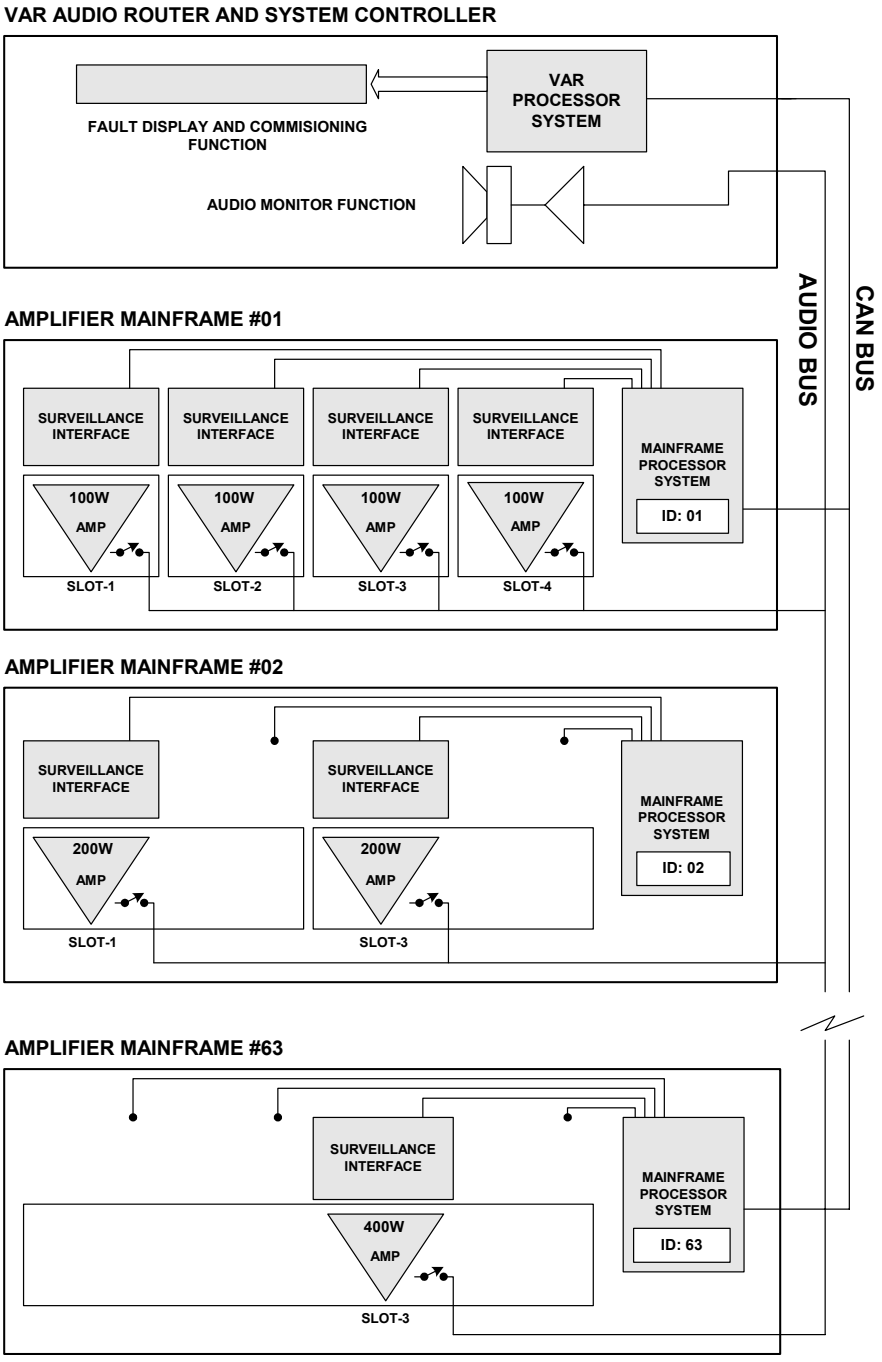
2.2 Communication with the ASL Amplifier System

The diagram in Figure 2 shows the VAR Router connected to the ASL Amplifier System. The VAR Router communicates with each Amplifier Mainframe processor via a CAN serial data network.

Up to 63 Mainframes can be connected. Each Amplifier Mainframe processor communicates with the Surveillance Interface Cards, associated with each of the internal amplifier modules, via a separate intra-frame interface. The VAR Router is therefore able to communicate with each Amplifier Surveillance Interface Card for configuration and fault reporting purposes. Each mainframe has four ‘slots’ for amplifier modules. A 100 W module occupies one ‘slot’, a 200 W amplifier 2 ‘slots’ and a 400 W amplifier 4 ‘slots’. An example of each is shown in the diagram.

Additionally the VAR Router can command any amplifier interface to connect the amplifier output to an audio monitor bus thus making it available for audio monitoring at the VAR Router loudspeaker. The audio monitor bus daisy chains between amplifiers along with the CAN bus. This interface is called Audio-CAN.

Figure 4 VAR Router and Amplifier Mainframes



3 Audio Router Functions

3.1 Architecture

The diagram in Figure 5 shows the audio architecture of the VAR20. The other variants have an identical architecture but reduced numbers of Mic/Line Inputs and DVAs.

The majority of audio processing functions are performed by DSP software. However, inputs 1 and 2 support failsafe Fire Microphone routing whereby the DSP elements are bypassed in the event of processor failure or software mis-operation. The Voice Alarm system is available for emergency announcements within 1.5 seconds of power-up. To achieve this, the VAR Router goes into to failsafe override mode:

- immediately after power-up; and
- immediately after a reset causing a reboot sequence.

So that the Fire Microphones are available for All-Call announcements.

Adjustable parameters are shown in the grey boxes in the figure. These are controllable by the user interface menu system described in the VAR Router Operation Manual.

3.1.1 Audio Routing

The VAR Router is able to concurrently route any of the potential input sources to any of the outputs.

Inputs are assigned priorities so that higher priority inputs override lower priority ones; see Section "3.4 Audio Input Priority and Override".

Five types of routing of the audio inputs are provided·

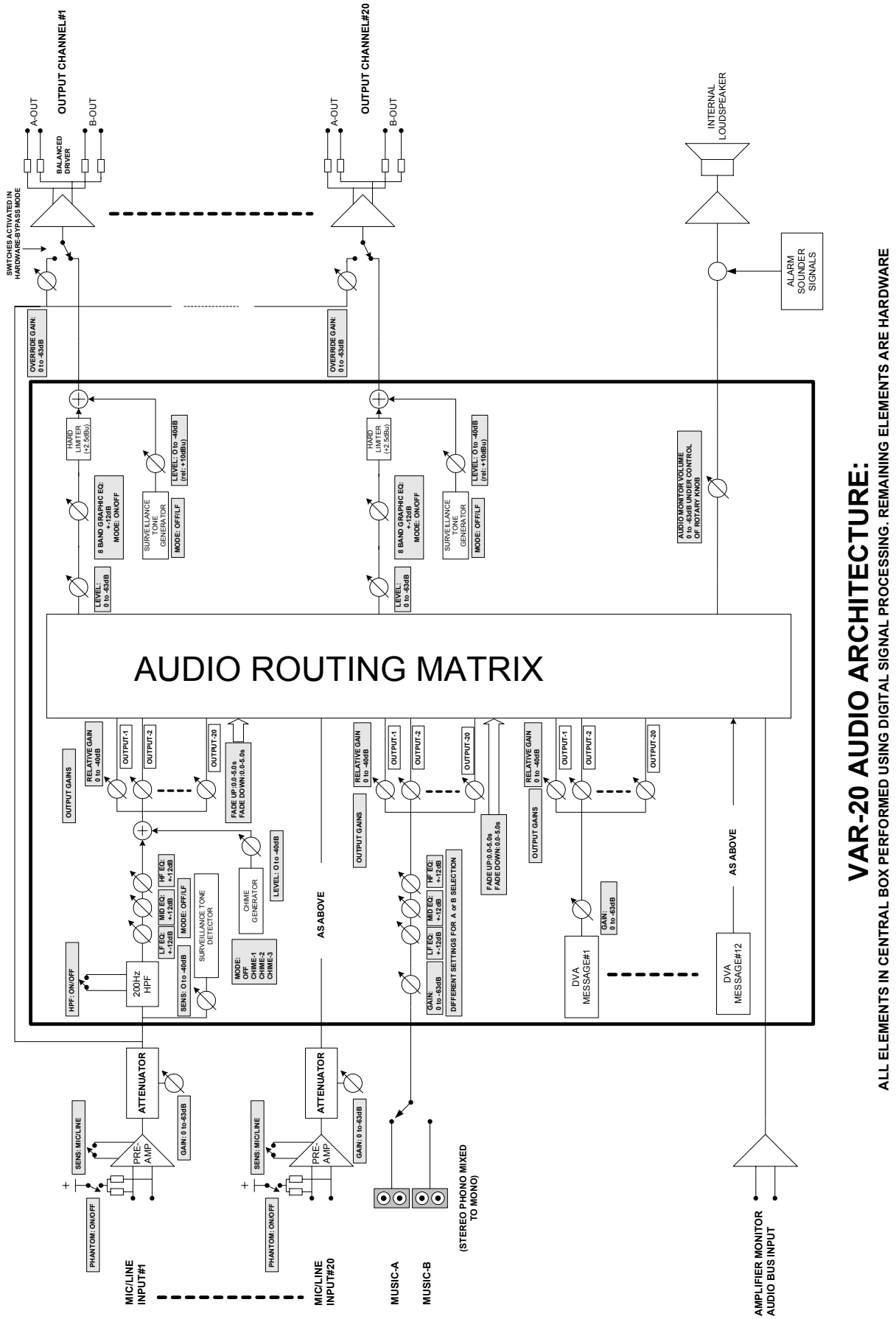
- Permanent Route

  See Section "3.8 Permanent Routes".
- Latent Route(s) activated by contact closure(s)

  See Section "3.7.3.1 Routing".
- Under the control of Microphone Station

  See Section "3.2.1 Mic/Line Inputs".
- Under Control of Fire Alarm System (DVA Routing)
- Remotely by a host computer via a serial interface

Figure 5 VAR Router Audio Architecture



3.2 Audio Inputs

Dependent on model, the VAR Router has 4,12 or 20 electronically balanced universal inputs, these have switchable sensitivity to accept microphone or line level signals, and have digitally controlled adjustable analogue gain prior to the DSP. These analogue gain settings are non-volatile and retained even after power failure and/or processor failure.

Each of these inputs features a serial communications interface to allow any ASL microphone to be connected.

The first two of these inputs can also be used for ASL emergency or Fireman's Microphones in Voice Alarm systems, this is because they have the facility for an analogue bypass mode in the event of processor failure/mis-operation, as required by BS5839 Pt 8. In the event of processor failure or communication failure, the operation reverts to All-Call mode. These two inputs also support DVA routing for triggering DVA messages.

Two Music inputs are provided, Music A and Music B. These accept stereo phono connections which are mixed to mono internally. It must be noted that these Music inputs are pre-selectable in the analogue domain prior to DSP routing. This allows two alternative background music sources to be connected. Only one can be routed at a time.

Each VAR Router provides a number (2, 4 or 6 dependent on model) of Long DVA messages (32 seconds) and a matching number of Short DVA (16 seconds) messages. These are treated as additional inputs to the routing matrix.

One additional input is provided on the Audio-CAN port, this is the Amplifier Audio Monitor Bus.

All inputs described above feed a DSP Audio Routing Matrix. Audio is soft-switched to prevent clicks, and fade times can be assigned suitable for background music applications.

3.2.1 Mic/Line Inputs

Each of the Mic/Line Inputs may be configured for a particular input type. The following sections describe the operation and routing of each input type. Table 1 summarises the VAR Router Mic/Line capabilities.

Table 1 VAR Router Mic/Line Input Capabilities

Inputs	Available Input Types	Microphone Buttons	VAR Router Applicability
1 and 2	ASL Fire Microphone	N/A	VAR4, VAR12, or VAR20
	ASL Zoned Fire Microphone	Up to 30 microphone buttons configurable for zone select, DVA routing, all call, or route reset.	
	ASL Paging Microphone		
	ASL Single Button Microphone	PTT routing.	
	Miscellaneous Input	N/A	
	Network Channel	N/A	VAR12 and VAR20 Option available only on Input 1. Input 1 is used for network operation when the VAR12 or VAR20 is connected to a VAR-NIA.
3 and 4	ASL Paging Microphone	Up to 30 microphone buttons configurable for zone select, all call, or route reset.	VAR12 and VAR20
	ASL Single Button Microphone	PTT routing.	
	Miscellaneous Input	N/A	
	Network Channel	N/A	VAR12 and VAR20 Inputs 3 and 4 are normally used for network operation when the VAR12 or VAR20 is connected to a VAR-NIA.
5 to 8	ASL Paging Microphone	Up to 20 microphone buttons configurable for zone select, all call, or route reset.	VAR12 and VAR20
	ASL Single Button Microphone	PTT routing.	
	Miscellaneous Input	N/A	
9 to 12	ASL Paging Microphone	Up to 10 microphone buttons configurable for zone select, all call, or route reset.	VAR12 and VAR20
	ASL Single Button Microphone	PTT routing.	
	Miscellaneous Input	N/A	
13 to 20	ASL Paging Microphone	Up to 5 microphone buttons configurable for zone select, all call, or route reset.	VAR20
	ASL Single Button Microphone	PTT routing.	
	Miscellaneous Input	N/A	

ⓘ All inputs can be configured to Unused mode. In this mode the input is excluded from routing and audio monitoring.

3.2.1.1 Paging Microphone Mode

It is possible to set any of the Mic/Line inputs for Paging Microphone operation. When configured for this mode of operation, any ASL Paging Microphone can be supported. For example: DMS5, DMS10, DMS20.

These units are desk consoles that provide zone selection buttons and indicators to show which buttons are selected and which zones are currently 'busy', i.e. in use by another user. The zone selection buttons are programmable by the VAR Router to correspond to the required outputs or groups of outputs (Mic Routing).

If a Paging Microphone is connected to inputs 1 or 2 the zone selection buttons are also programmable by the VAR Router for DVA Routing. The primary function is triggering DVAs although it can connect any desired combination of inputs to outputs. The operation and configuration are similar to that of Latent Routes; see Section "3.7.3.1 Routing". Note that a button cannot be assigned as control to switch between Music A and Music B phono inputs.

Any microphone button may be programmed as an All-Call button. This button is equivalent to pressing all other configured zone selection buttons.

The security key-switch, when configured, protects the button function. When protected, the key must be turned on for the button function to be allowed. The security key is intended to safe guard emergency DVA triggers from inadvertent operation, but may be used protect buttons used only for paging.

The button and LED data is communicated between the Microphone and VAR Router by means of a dedicated RS485 data link provided on each Mic/Line Input.

3.2.1.2 Zoneable Fire Microphone Mode

Zoneable Fire Microphone operation is configurable for inputs 1 & 2 only. Any ASL Zoneable Fire Microphone may then be connected. For example: FMS5, FMS10, and FMS20.

These units provide zone selection buttons and indicators to show which buttons are selected and which zones are currently 'busy', i.e. in use by another user. The zone selection buttons are programmable by the VAR Router to correspond to certain outputs or groups of outputs (Mic Routing).

The zone selection buttons are also programmable by the VAR Router for DVA Routing. The primary function is triggering DVAs although it can connect any desired combination of inputs to outputs. The operation and configuration are similar to that of Latent Routes; see Section "3.7.3.1 Routing". Note that a button cannot be assigned as control to switch between Music A and Music B phono inputs.

Any microphone button may be programmed as an All-Call button. This button is equivalent to pressing all other configured zone selection buttons.

The security key-switch, when configured, protects the button function. When protected, the key must be turned on for the button function to be allowed. The security key is intended to safe guard emergency DVA triggers from inadvertent operation, but may be used protect buttons used only for paging.

The Zoneable Fire Microphones use the same serial control interface as the Paging Microphones to communicate button and LED status.

As well as a serial interface, a hardwired PTT is interfaced to the VAR Router. This switch is provided with resistors to allow the cabling to be monitored for faults.

A hardwired SPEAK-NOW LED and ALL-CALL-ONLY LED are also provided. Operation is as described below:

- Normal Operation

  In normal operation, all routes are set up via the serial interface, and audio is routed via the DSP. The hardware ALL-CALL contact is used as the PTT in order to provide BS5839 functionality.

  A hardwired SPEAK-NOW LED is illuminated on the Fire Microphone once the route is made (and chime has sounded).

- Failsafe Operation

  If the VAR Router detects processor failure or mis-operation, a hardware bypass mode comes into operation for the Fire Microphones. When this happens the Router provides an ALL-CALL-ONLY signal back to the Fire Microphone, which illuminates the ALL-CALL-ONLY LED on the Fire Microphone panel. When the PTT is pressed, an All-Call analogue bypass path is driven which bypasses all processor controlled elements.

  The hardwired SPEAK-NOW LED is illuminated on the Fire Microphone once the route is made.

  If the RS485 communications link fails but the VAR Router processor is running correctly the ALL-CALL-ONLY LED is illuminated and operation reverts to all-call. However in this case the audio is still routed through the DSP.

3.2.1.3 Fire Microphone (ALL-CALL) Mode

Fire Microphone operation is configurable for inputs 1 & 2 only. Any ASL All-Call Fire Microphone may then be connected. For example: FMS1, EAP01.

All-Call Microphones do not need a serial interface. However, the serial interface may be installed if a busy LED function is required. These microphones have a hardwired PTT switch interfaced to the VAR Router, this switch is provided with resistors to allow the cabling to be monitored for faults by the VAR Router.

A hardwired SPEAK-NOW LED is also provided. Operation is as described below:

- Normal Operation

  In normal operation, All-Call is initiated by the controller monitoring the state of the contact and routing audio via the DSP to all outputs.

  A SPEAK-NOW LED is provided on the Fire Microphone, and is driven by the processor once the route is made (and chime has sounded).

- Failsafe Operation

  If the VAR Router detects processor failure or mis-operation, a hardware bypass mode comes into operation for the Fire Microphones.

  When the PTT is pressed, an All-Call analogue bypass path is driven which bypasses all processor controlled elements.

  The SPEAK-NOW LED is illuminated on the Fire Microphone once the route is made.

3.2.1.4 Single Button Microphone Mode

It is possible to set any of the Mic/Line inputs for Single Button Microphone Operation. For example: SAP01.

A Single Button Microphone provides indicators and PTT button. The PTT button can be programmed for zone selection at the VAR Router to correspond to certain outputs or groups of outputs.

The button and LED data is communicated between the Microphone and VAR Router by means of a dedicated RS485 data link provided on each Mic/Line input.

3.2.1.5 Miscellaneous Input Mode

It is possible to set any of the Mic/Line inputs as Miscellaneous Input Mode. When configured for this mode of operation, the serial communication interface is disabled and other type of audio input may be connected, e.g. PC/DVA audio, Long Line PA (LLPA) audio, or an additional background music input. The audio may be routed by the Permanent Route or Latent Contact Route mechanisms; described respectively in Sections “3.8 Permanent Routes” and “3.7.3.1 Routing”.

3.2.1.6 Network Channel Mode

By default if a VAR-NIA is connected to VAR12 or VAR20, the VAR Router Inputs will be used as follows:

- Network Channel 1 – VAR Router Input 1
- Network Channel 2 – VAR Router Input 3
- Network Channel 3 – VAR Router Input 4

This is the Intellevac Network standard configuration with 3 network audio channels.

It is possible to implement fewer network channels where concurrent broadcast of ALERT, EVACUATE and Fire Microphone audio is not required. The corresponding VAR12 or VAR20 inputs would then be available for connection of local microphones or other audio sources.

3.2.1.7 Unused Mode

It is possible to set any of the Mic/Line inputs to “Unused” Mode. When configured for this mode of operation they are excluded from routing and audio monitoring.

3.2.1.8 ‘Listen-in’ Function on Station Master Console

The ASL Station Master Console (SMC) functions as a normal Zoneable Fire Microphone with additional ‘listen-in’ function provided by an audio feed from the Aux Output (AUX-OUT) on the Control Port 1 of the VAR Router which feeds a local amplifier and loudspeaker within the console. A key-switch programmable by the VAR Router and an associated LED control the ‘listen-in’ function. The ‘listen-in’ key may be operated in ‘Listen-to-All’ or ‘Selective Listen’ mode:

- ‘Listen-to-All’ mode

  The audio sources, which are currently routed to outputs associated with zone select buttons, will be mixed together and routed to the Aux Output. The ‘Listen-to-All’ mode is activated by momentarily pressing the ‘listen-in’ key. Re-pressing the ‘listen-in’ key momentarily will deactivate the ‘listen-in’ function.

- ‘Selective Listen’ mode

  The audio from the source associated with a selected zone is routed to the Aux Output. The ‘Selective Listen’ mode is activated by holding down the ‘listen-in’ key while simultaneously pressing a zone select button. It is possible to add other sources to the audio-mix by momentarily pressing the associated zone select buttons. Re-pressing the listen-in key momentarily will deactivate the ‘listen-in’ function.

Activating the ‘listen-in’ function cause the listen-in LED on the microphone console to latches on.

When the ‘listen-in’ function is active, the normal paging operation will be barred. Neither the zone select nor PTT buttons will have any effect.

While the ‘listen-in’ function is active, the audio-mix will update accordingly if the routed audio sources change to the selected zone.

3.2.2 Digital Voice Announcers

Digital Voice Announcer (DVA) messages are divided into two types:

- Long DVA: up to 32 second message length

  VAR4 provides storage for 2 Long DVAs

  VAR12 provides storage for 4 Long DVAs

  VAR20 provides storage for 6 Long DVAs
- Short DVA: up to 16 second message length

  VAR4 provides storage for 2 Short DVAs

  VAR12 provides storage for 4 Short DVAs

  VAR20 provides storage for 6 Short DVAs

The DVAs may be configured so that they either stop immediately, part way through a message when terminated, or can be configured to play the message to the end.

The DVAs are usually controlled by VAR Router contact inputs, which interface to a Fire Alarm panel. Any VAR Router contact may be assigned to this function. Two modes of operation are supported:

- Latching: the trigger is latched by the VAR Router. This requires a separate reset input from the Fire Panel to terminate the route.
- Non-Latching: a reset signal is not required. The route is terminated when the trigger ends.

The DVAs may be also routed by the Permanent Route mechanism described in Section “Permanent Routes”.

3.2.3 Background Music

The two phono Music inputs (Music A and B) maybe be routed by two means:

- Permanent Route: typical for background music.
- Latent Route(s) activated by contact closure. A separate contact may be specifically assigned as a music selector to switch between either Music A or Music B sources.

Additional music sources may be connected to any Mic/Line input configured as a Miscellaneous Input.

3.2.4 Mute Input

The VAR Router provides a special ‘Mute’ Input, which mutes even fire microphones if needed. For this purpose its priority is set to ‘0’ by default. However, the mute input is configurable, so it is possible to mute just DVAs, and/or any other inputs.

3.3 Audio Outputs

The VAR Router provides 4, 12 or 20 (dependent on model) electronically balanced outputs. These provide a nominal 0 dBu output, which when fully driven, corresponds to 100 V output from the ASL amplifier. Each VAR Router output has separate A and B output connections for driving A&B amplifiers with interleaved speaker circuits. The A and B outputs are isolated so that a short circuit on one output will not affect the other.

The output is hard-limited to +2.5 dBu. The outgoing surveillance tone is not limited in this way. Thus if the audio is overdriven, the surveillance tone is not clipped.

The outputs are normally fed from the DSP and all processing is performed in the digital domain. Each output, is however equipped with an ‘override gain’ setting. This enables independent adjustment, for each zone, of the level of the Fire Microphones when the VAR Router is in the hardware bypass mode. These analogue gain settings are non-volatile and retained even after power failure and/or processor failure.

One additional output is provided from the routing matrix; this feeds the internal amplifier/loudspeaker for Audio Monitoring functions.

The top two outputs of the VAR Router’s base unit and expand units can be configured to feed a 100 V line driving an amplifier connected to an Induction Loop System, typically the ASL ILP01 Induction Loop Panel. The number of induction loop outputs is configurable, and the induction loop outputs are allocated from top down, as detailed in Table 2.

In addition to standard parameters an Induction Loop output has the following Induction Loop specific parameters:

- Equalisation

  Frequency bands suitable for the Induction Loop type can be adjusted to achieve as flat a frequency response as is possible.

- Audio amplitude compression

  The amount of compression and the threshold level at which the compression begins can be configured in order to achieve the best intelligibility and general received sound quality.

The VAR Router provides test tones, which can be used during the commissioning of an Induction Loop System. See Section “3.11 Test Tone Generation” for further details.

Table 2 VAR Router Induction Loop Outputs

VAR Router	Possible Number of Induction Loops	Output Number	Output Location
VAR4	1	4	Base Unit
	2	3	Base Unit
		4	
VAR12	1	12	Expand Unit 1
	2	11	Expand Unit 1
		12	
	3	4	Base Unit
		11	Expand Unit 1
		12	
	4	3	Base Unit
		4	
		11	Expand Unit 1
		12	
VAR20	1	20	Expand Unit 2
	2	19	Expand Unit 2
		20	
	3	12	Expand Unit 1
		19	Expand Unit 2
		20	
	4	11	Expand Unit 1
		12	
		19	Expand Unit 2
		20	
	5	4	Base Unit
		11	Expand Unit 1
		12	
		19	Expand Unit 2
		20	
	6	3	Base Unit
		4	
		11	Expand Unit 1
		12	
		19	Expand Unit 2
		20	

3.4 Audio Input Priority and Override

The input priority is used to resolve conflicts when two or more inputs try to broadcast to the same output. In this case the input with the highest priority will be able to broadcast, and the others will not.

19 priority levels available, and can be assigned to any of the audio input sources.

Priority is assignable to each input per output. This is so that different inputs may have different priorities according to which zone they are serving. For example a particular microphone may have a high priority only in its local zone, and a lower priority when broadcasting elsewhere.

Assignment of equal priorities to different inputs means that those inputs operate on a 'first-come-first-served' basis.

1. Care should be taken in ensuring that Fire Microphones, and Alarm and Emergency DVAs have a high priority and non-emergency sources, such as Paging Microphones and music sources, have low priorities.
2. In a networked system it is essential that:
   a. The Slave Units are programmed so that they know the Priorities of the Audio Control Unit's audio sources in order that priorities can be successfully arbitrated between their local inputs and the audio inputs into the Audio Control Unit.
   b. The Audio Control Units are programmed so that they know the Priorities of the Slave Unit's audio sources, in order that priorities can be successfully arbitrated across the networked system when the Audio Control Unit initiates a remote route.

An override occurs when a higher priority input taker over control of an output broadcast from a lower priority input.

Table 3 describes the actions in the event of override. The system is able to support up to 40 overrides per output.

Table 3 Override

Input Type	Action in Event of Override
Fire Microphone	If Inputs 1 and 2 are assigned as Fire Microphones, they operate on a priority basis (by default 1>2). If 1 overrides 2 then 2 will be restored immediately that 1 has completed the announcement.
Zoneable Paging Microphone Single Button Microphone	When broadcasting to a group of zones the user may be overridden during paging in any zones in which other users have higher priority. In this case, the original broadcast will be able to continue to page the remaining zones. If the override source is removed during the original announcements the overridden zones will not be re-instated. This is to minimise the broadcast of potentially ambiguous or annoying message fragments.
DVAs	If a DVA is overridden it is silenced immediately in the zone(s) in which it is overridden. When the override is removed it is re-instated immediately, i.e. does not wait until the beginning of the cycle.
Permanent Route	If overridden, the route is restored immediately the override is removed. A soft fade-up may be desirable if background music is being overridden; this may be readily programmed for the input being used for the music.
Latent Route	If overridden, the route is restored immediately the override is removed. A soft fade-up may be desirable if background music is being overridden; this may be readily programmed for any input that is being used for the music.

3.5 Fades and Chimes

3.5.1 Fades

It is possible to specify a fade up and fade down time for each Mic/Line or Music input source.

This is typically used on background music where a slow fade-up, in particular, is desirable.

The Fade Down time is:

- The time it takes for the signal to fade down when turned off (un-routed);
- The time it takes for the signal to fade down before an overriding broadcast is made in its place.

The Fade Up time is the time the signal takes to fade up when:

- Turned on (routed);
- Override removed.

Even when the fade parameters are set to zero, a small finite fade is used in order to provide click-free audio switching.

It is important that in order for a DVA or Fire Microphone to be able to override a background music source quickly, they are set up for a short Fade Down time.

3.5.2 Chimes

It is possible to configure a chime to be broadcast at the start of an announcement from any Mic/Line input source. Chimes are not assignable to the music inputs or DVAs. However, if desired then chimes can be recorded as part of DVAs.

The chime is triggered when that source is routed; the actual audio, however, is only routed when the chime is complete.

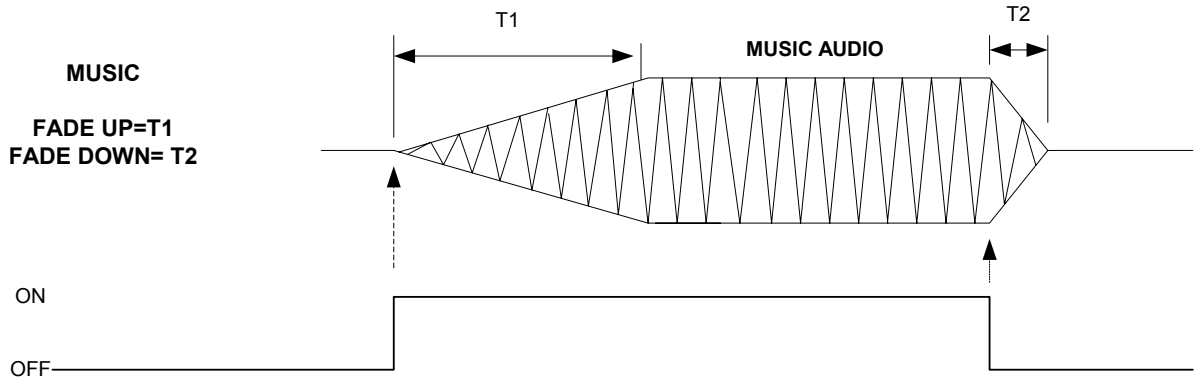
It is possible to configure the following chime types:

- Off: No chime.
- Chime-1: Single note.
- Chime-2: Two note descending overlapping pattern.
- Chime-3: Three note descending overlapping pattern.

3.5.3 Sequence of Events

The diagram in Figure 6 illustrates the sequence of events during the enabling and disabling of a single audio source (e.g. background music).

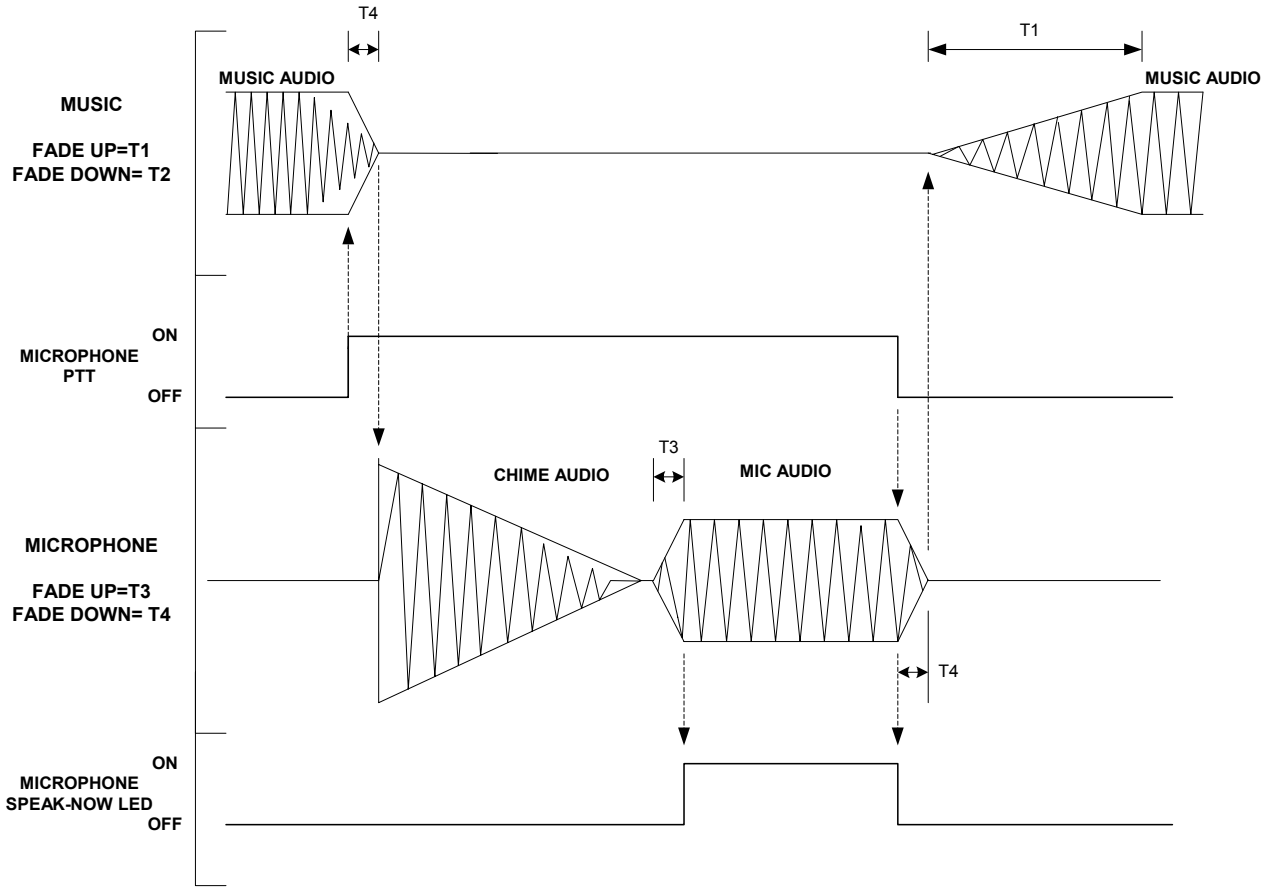
Figure 6 Sequence of Events for Single Audio Source



The diagram in Figure 7 illustrates the sequence of events during the override of a background music source by a Paging Microphone with chime.

Note that the background music Fade Down time (T2) not used in this instance. Instead the microphone Fade Down time (T4) is used.

Figure 7 Sequence of Events for Paging Microphone Chime Overriding a Background Music



3.6 Surveillance Tone Detection and Generation

3.6.1 Detection

The VAR Router is able to detect the presence of a low frequency 20 Hz surveillance tone on the Mic/Line inputs. ASL Microphones produce this tone as standard.

Surveillance Tone detection can be configured ‘on’ or ‘off’ per input. The detection threshold is adjustable per input. With surveillance configured to ‘on’ then in the absence of a surveillance tone, or with the surveillance tone below the detection threshold, then an input audio fault will be raised and logged.

3.6.2 Generation

The VAR Router is capable of generating a low frequency 30 Hz surveillance tone, at each audio output. Surveillance tone generation is configurable either ‘on’ or ‘off’ or ‘pulsed’ per output. The outgoing tone level per VAR Router output is also adjustable.

Pulsed surveillance tone uses less power than continuous ‘on’ surveillance.

If configured as ‘pulsed’, the pulse interval is 20 seconds, and the pulse ‘on’ time is 1 second. The ‘on’ and ‘off’ envelope of the pulsed surveillance is so shaped that no audible artefacts can be heard.

3.7 Control Ports

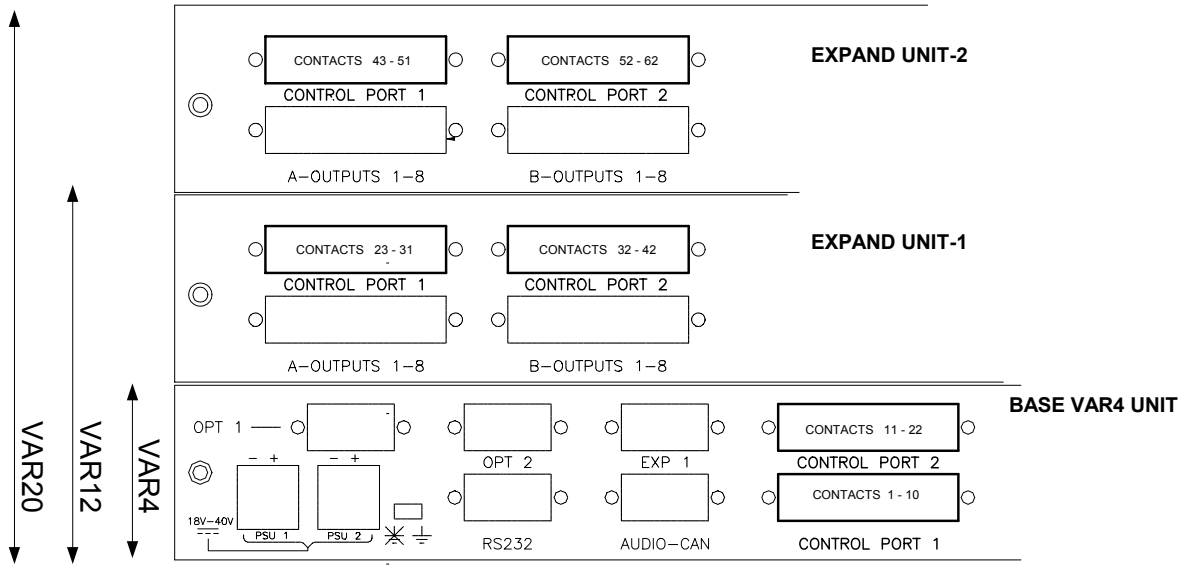
The VAR Router is equipped with control ports for the following functions:

- DVA Routing (Fire Alarm system interface)
- Latent Routes
- External Fault Inputs

The VAR Router is able to provide additional control I/O by means of Remote I/O Units (BMB01), which are described in Section “3.9 Remote I/O Units”.

The VAR4, 12 and 20 control ports are shown on the rear panel diagram in Figure 8.

Figure 8 VAR Router Control Ports



All ports on the expand units are opto-isolated interfaces. The base VAR4 unit has two types of control ports; one is an opto-isolated interface, the other is an analogue port.

The following sections describe the characteristics of the ports.

Table 4 VAR Router Control Ports

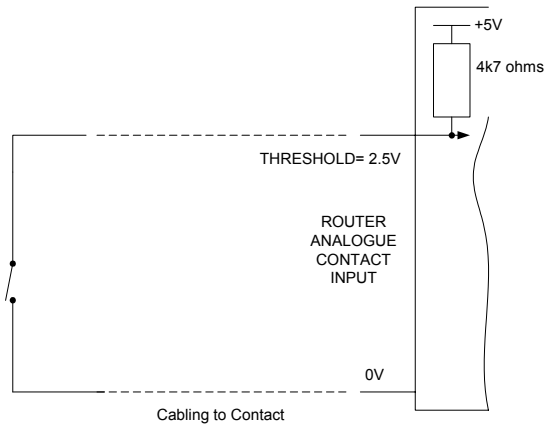
VAR	Port Type	Control Port Number	Contacts
VAR4	Analogue	Base Unit - Port-1	1 – 10
	Opto-Isolated	Base Unit - Port-2	11 – 22
VAR12	Analogue	Base Unit - Port-1	1 – 10
	Opto-Isolated	Base Unit - Port-2	11 – 22
	Opto-Isolated	Expand Unit 1 - Port-1	23 – 31
	Opto-Isolated	Expand Unit 1 - Port-2	32 – 42
VAR20	Analogue	Base Unit - Port-1	1 – 10
	Opto-Isolated	Base Unit - Port-2	11 – 22
	Opto-Isolated	Expand Unit-1 - Port-1	23 – 31
	Opto-Isolated	Expand Unit-1 - Port-2	32 – 42
	Opto-Isolated	Expand Unit-2 - Port-1	43 – 51
	Opto-Isolated	Expand Unit-2 - Port-2	52 – 62

3.7.1 Analogue Interface

Contacts 1 to 10 only use a non-isolated analogue interface with an internal pull-up to 5 V. The analogue interface operates in two modes: ‘non-monitored’ and ‘monitored’. Each contact is individually selectable between these two modes.

3.7.1.1 Non-monitored Contact Closure to Ground

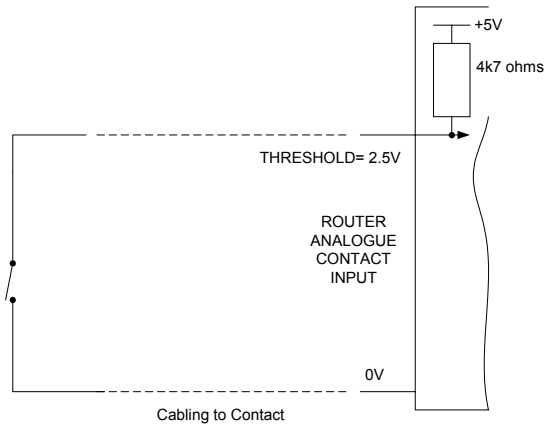
It may be used to interface a simple contact closure to ground.



3.7.1.2 Monitored

It may be used to interface resistively monitored contacts.

This interface enables the VAR Router to monitor the interface to the Fire Panel or other contact closure. The contacts must be fitted with 6k8/470R resistors. This method of monitoring has been used extensively in the past and is prevalent in continental Europe.

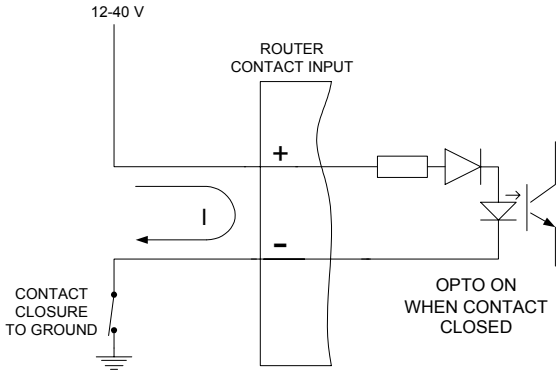


3.7.2 Opto-Isolated Interface

Contacts 11 through to 62 use an opto-isolated interface. The contact is asserted when the opto-isolator is turned on. These may be used to interface a simple closure, or as a Sounder Circuit Interface that is suitable for connecting the Fire Alarm to the VAR Router for triggering DVA messages.

3.7.2.1 Contact Closure to Ground

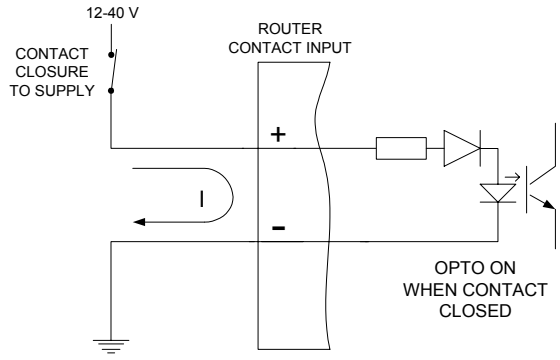
A simple contact closure to ground may be connected as shown. Note that the external pull-up to 24 V is not needed if none of the contacts on the port are set up for routing. If any contacts are set up for routing, then the global internal pull-ups on all contacts of the port are disabled in order to provide a true volt-free interface for the routing functions.



3.7.2.2 Contact Closure to Supply (+VE going Input)

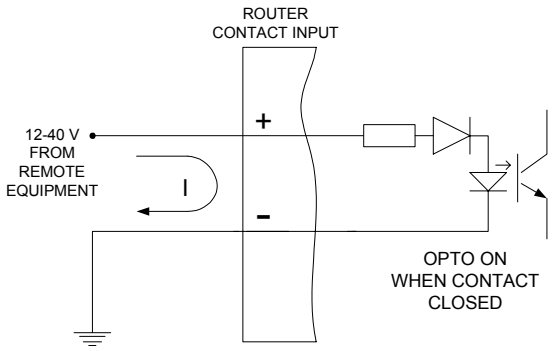
In this method a contact closure is not made to ground, but to a supply, with a fused connection do ground. This may be appropriate, depending on the signal source.

Note that for reliable operation it is recommended that the 0 V reference is taken back to the 0 V of the equipment that supplies the +VE signal.



3.7.2.3 Positive Voltage Source (+VE going Input)

As per Contact Closure to Supply, but to an alternatively switched voltage source, such as to a suitable output from another piece of equipment.

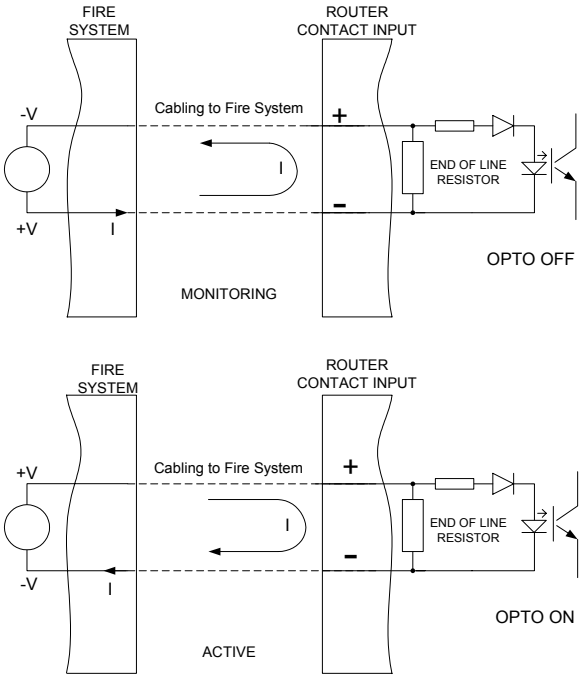


3.7.2.4 Fire Alarm Sounder Interface

The opto-isolated inputs may be used as a reverse polarity sounder circuit interface to a Fire Alarm system. In this DVA triggering method the link between the fire panel and the VA system is monitored at the Fire Panel by means of End of Line Resistors. This is the current recommendation of BS5839. The Fire panel monitors the current flowing in the End of Line Resistor. Reversing the polarity activates the input.

The VAR Router does not have end of line resistors fitted as standard, as the value required varies according to the Fire Alarm system. The desired value for a particular job must be specified with the order. ASL can then factory-fit the appropriate resistors.

Alternatively these resistors may be fitted local to the VAR Router during installation. Note that in this method the final connection into the VAR Router is not monitored.



3.7.3 Contact Functions

3.7.3.1 Routing

Any contact may be configured to control Latent Routes, i.e. pre-programmed routes which are controlled by a contact closure. Routes may be assigned as Non-latching or Latching. In the latter case, a separate contact may be assigned as a matching ‘reset’ contact.

3.7.3.1.1 Latching Mode

Any contact may be configured to trigger a latched Latent Route. A momentary, or prolonged, activation of a latching trigger initiates routing. A separate contact is required for latching inputs, to act as a ‘reset’ contact.

This method is normally used to trigger emergency DVAs from fire systems, although any input source may be routed in this way. For Fire Alarm DVA messages, BS5839 Pt 8 recommends the use of latched triggers with separate resets, so that the message will continue to run even if the trigger pair fails.

Each latching trigger can be configured to initiate routing of any DVA to any output. It is possible to initiate simultaneous routing of multiple DVAs to multiple outputs with a single trigger. This is so that, for example, Alert and Evacuate messages may be able to be broadcast to different zones for a single trigger. The DVA or DVAs will play until a momentary assertion of the matching ‘reset’ line, unless the corresponding trigger is still asserted, in which case the DVA will not be reset.

It is possible to configure whether or not a particular route causes busy indications to be shown on microphone consoles.

For example, a busy indication would not be desired if the Latent Route mechanism was to be used for enabling a background music source.

If used as a DVA trigger, the contact is configurable for two modes: ‘DVA Full’ and ‘DVA Part’.

- DVA Full

  In the ‘DVA Full’ mode, when the ‘reset’ is received, the DVA or DVAs will complete its full message cycle and broadcast till the end of the DVA message before ending.

- DVA Part

  In the ‘DVA Part’ mode, when the ‘reset’ is received, the DVA or DVAs will end immediately even if part way through a DVA message broadcast.

DVAs can be assigned priorities as described in Section “3.4 Audio Input Priority and Override”. Once triggered, DVAs may be overridden by any higher priority DVAs, or other inputs that are routed to the same output.

A group of route triggers may share a single reset, or each route trigger can have its own dedicated reset. If multiple DVA routes have been triggered by consecutive triggers in a single group, the activation of that group’s ‘reset’ line unlatches all the DVA routes associated with that reset. However, if any of the triggers are still asserted, these DVAs will continue to play, while the others will be reset.

3.7.3.1.2 Non-Latching Mode

Any contact may be configured to trigger a so-called non-latching Latent Route.

When the contact is made, a pre-programmed route is set up. When the contact is released, the route is cleared, no separate 'reset' input is required.

Application examples are (1) when simple paging is required (not using ASL microphones) or (2) when background music needs to be routed to selectable areas.

It is possible to use the Latent Route mechanism to allocate any output to any audio input, Mic/Line, DVA, or Music.

> It is possible to configure whether or not a particular Latent Route causes busy indications to be shown on microphone consoles.
>
> For example, a busy indication would not be desired if the Latent Route mechanism was to be used for enabling a background music source.

If a Latent Route is used to trigger a DVA, the trigger is configurable for two modes as for a latching route:

- DVA Full

  In the 'DVA Full' mode, when the trigger is de-asserted, the DVA(s) completes its full message cycle before ending.

- DVA Part

  In the 'DVA Part' mode, when the trigger is de-asserted, the DVA(s) ends immediately even if part way through a DVA message broadcast.

When a Latent Route is made and the routes set up, any further routes added via the VAR Router user-interface are automatically added to the existing routes. Similarly routes may be removed via the user interface 'on-the-fly'. That is to say: it is not necessary to de-assert and then re-assert the Latent Route in order to recognise changes in the Latent Route set up.

Although two music inputs, A+B, are provided, they are switched in the analogue domain before digitisation. Therefore only one may be routed at a time. The application example is where a background music source is required but may be chosen from CD player or radio Tuner.

Music may be routed via the Latent Route mechanism, any other contact may be assigned as switch to select either A or B. this is useful for selecting between two alternative music sources, i.e. Tuner or CD player.

3.7.3.2 External Faults

Any contact may be configured as an external fault input.

It is possible to assign an 18 character alphanumerical description to a contact input when it is configured as an external fault input.

This is to enable external equipment which provide normally closed relay contacts to indicate healthy status, to be integrated into the VAR Router fault monitoring system. A typical example in a VA system is the battery charger.

An active low contact closure on the port indicates a 'no fault' condition. Open circuit on the port will cause a fault to be reported and logged. The specific fault that is raised will be identified by the alphanumerical description.

3.7.3.3 Remote Fault Accept

The VAR Router provides outputs to drive a remote Fault Panel (see Section "Remote Fault "); typically this consists of a drive to a sounder, and fault LED. Any contact may be configured as the 'Accept' for the remote Fault Panel; this acts as a local 'fault accept' button affecting only the remote indication.

3.7.3.4 Music A/B Switching

Music may be routed via the Latent Route mechanism as mentioned in Section “3.7.3.1.2 Non-Latching Mode”, any contact may be assigned as a control to switch between Music A and Music B phono inputs.

3.7.4 Remote Fault Indication

Besides the analogue and opto-isolated contacts the VAR Router provides two open collector outputs on the base VAR4 unit Control Port 1, REMOTE FAULT-1 and REMOTE FAULT-2. These outputs are designed to drive a remote Fault Panel. This panel enables remote fault indication and annunciation.

Each output is configurable by the VAR Router to drive a sounder, a fault LED, or an emergency DVA indicator. Any contact may be configured to act as a local ‘fault accept’ button for the remote Fault Panel, see Section “3.7.3.3 Remote Fault Accept”.

3.8 Permanent Routes

It is possible to program specific inputs to be permanently allocated to specific outputs. Such routes are ‘permanent’ unless overridden by a higher priority input. The route is restored once the higher priority input is removed.

The typical scenario is background music, which may want to be assigned to certain areas. For example, to route music to the shop-floor areas in a factory complex unless another broadcast was active. It is possible to allocate any output to any audio input by means of the permanent route mechanism.

Although two music inputs, A+B, are provided, they are switched in the analogue domain before digitisation. Therefore only one may be routed at a time. Either Music A or Music B may be routed by the Permanent Route mechanism. If, however both are selected Music A will have priority over Music B and all routes using Music B will switch to Music A.

If concurrent permanent routes are required to disparate zones, for example to route different music to two different areas, then the background music input can be used for one source and Mic/Line Inputs should be used for the additional music sources.

A permanent route does not cause a busy indication on any microphone, otherwise all zones would appear permanently busy in a scenario where background music feeds all zones.

3.9 Remote I/O Units

The VAR Router is able to support the connection of up to 9 Remote I/O units (ASL Product: BMB01).

The BMB01 units provide additional analogue and opto-isolated digital inputs, and open collector digital outputs. This extends the control and interfacing capability of the system. The BMB01 units are interfaced via a power and RS485 data link that can be up to 1 km long, in order to interface to remote equipment.

Each BMB01 Remote I/O Unit provides the I/O capability as described in Table 5.

Table 5 Remote I/O Unit Inputs and Outputs

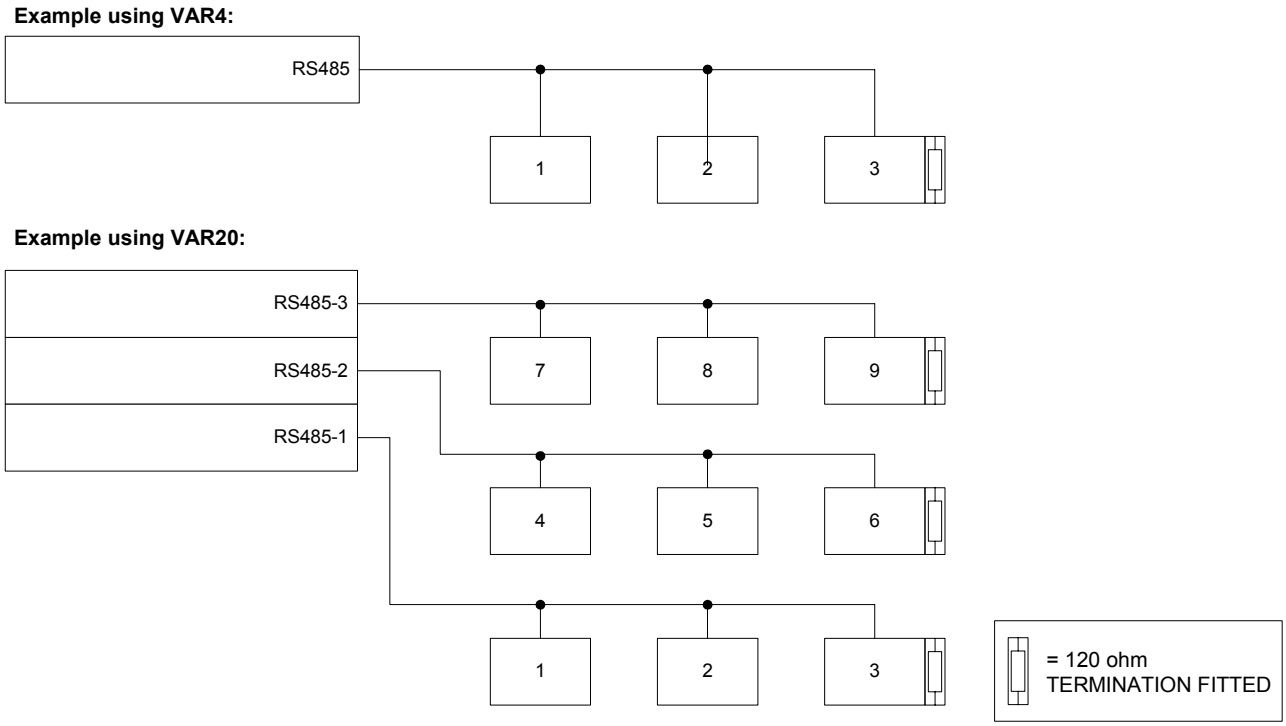
Type		Quantity	Functions
Analogue Input	non-isolated	12	Programme Selector Volume Control Ambient Noise Sensor (ANS) Fault Input
Digital Input	opto-isolated	12	Routing Control Reset Input Fault Input
Digital Output	open-collector	12	Busy Output

The VAR4 provides a single RS485 bus for the connection of the Remote I/O Units. The VAR12 and 20 provide 2 and 3 such busses respectively. These are labelled EXP on the rear panels. See the examples shown in Figure 9.

Up to 9 Remote I/O Units may be connected in total each with a unique address set up using an internal rotary switch. The Remote I/O Units can be connected to any of the RS485 busses.

If using a VAR12 or VAR20, in order to optimise response time, it is sensible to distribute them across the alternative busses.

Figure 9 Remote I/O Connection to RS485 Busses



The RS485 data link to the Remote I/O Units is fully monitored. In the event of communications failure, the VAR Router will log a fault. The fault code identifies the specific unit or units that are affected.

- The maximum recommended distance for the RS485 data link is 1 km.
- Only the last physical Remote I/O Unit in the chain should have the RS485 termination enabled.
- A single RS485 bus supports up to 3 Remote I/O Units.

3.9.1 Analogue Inputs

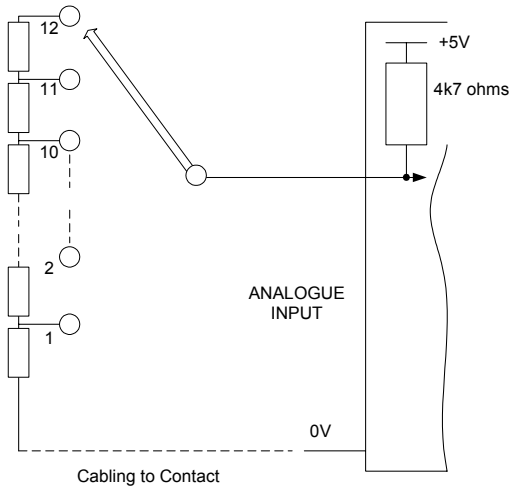
Each analogue input channel may be assigned as either a Programme Selector, a Volume Control, an ANS Sensor, or a Fault Input.

The Programme Selector and Volume Control functions use a 12 step resistive ladder switch arrangement shown in Figure 10.

ASL produces a range of Selector and Volume Control products that are suitable for standard wall plate mounting.

The fault input is simply a contact closure to ground, which operates as described in Section "3.7.3.2 External Faults".

Figure 10 BMB01 Analogue Inputs



3.9.1.1 Programme Selector Operation

The application of the Programme Selector function is to allow remote selection of alternative sources to a specific zone or zones. Normally the programme selector will be mounted within the zone and allow selection of alternative sources, such as different background music sources.

It is possible to assign a particular Programme Selector to be associated with one, or any group of, VAR Router outputs. It is then possible to assign which input each position of the Programme Selector corresponds to.

The connection between the Remote I/O Unit and the Programme Selector is monitored, so that open and short conditions on the cabling are detected and logged by the VAR Router. The VAR Router fault report identifies the specific Remote I/O Unit and the particular analogue channel number affected.

In the event of such a fault, the routing defaults to that set up on position '1'. Normally this would correspond to all routes being 'off'.

The same default operation occurs in the event of RS485 communications failure to the Remote I/O Unit.

There should be only one Programme Selector associated with an output or group of outputs. Associating an output with more than one Program Selector would cause unpredictable results.

3.9.1.2 Volume Control Operation

The application of the Volume Control function is to allow remote control of the volume of specific input sources within a specific zone or zones. Normally the volume control will be mounted within the zone and allow the control of the specific sources, such as background music sources, while leaving the volume of all other sources unaffected.

It is possible to assign a particular Volume Control to be associated with one, or any group of, VAR Router outputs. It is then possible to assign which input, or group of inputs, are controlled.

Each step of the volume control gives exactly 3dB attenuation, with position '1' being 'off'.

The connection between the Remote I/O Unit and the Volume Control is monitored, so that open and short conditions on the cabling are detected and logged by the VAR Router. The VAR Router fault report identifies the specific Remote I/O Unit and the particular analogue channel number affected.

In the event of such a fault, the volume will default to that set up on position 'off', i.e. the maximum level.

The same default operation occurs in the event of RS485 communications failure to the Remote I/O Unit.

Only one Volume Control should be configured to govern an input in respect of a single output. If two Volume Controls are configured to govern the same input in respect of an output, then the results are unpredictable.

3.9.1.3 Ambient Noise Sensor (ANS)

The purpose of an ANS system is to adjust the level of public address announcements based on a measure of the ambient noise in the target zone. This is intended to maintain a set volume of public address audio above the ambient noise, in order to guarantee that the announcement is intelligible, yet at a comfortable level.

The ANS sensor (ASL ANS01, ANS02, ANS03, or ANS04) is an analogue device that produces a DC voltage proportional to the measured ambient noise level.

The DC voltage is received via the Remote I/O Unit analogue channel, and is translated to a value of measured ambient noise in dBA. This value is used to proportionally adjust the VAR Router output gain for the configured output channels.

The VAR Router is set up for the maximum broadcast volume without the ANS, and the ANS system then reduces the gain from this level when the zone is quiet.

In the ANS setup, a minimum threshold value of ambient noise (in dBA) is programmable to each output. This is used to limit the range over which the gain may be reduced. When the ambient noise reaches or is below this value, the Router applies the maximum reduction to the output gain. Therefore this has the minimum gain, and a lower ambient noise will not reduce the broadcast volume further.

A maximum threshold value of ambient noise (in dBA) in the zone is also programmable to each output. When the ambient noise reaches or exceeds this value, the Router applies the full configured output gain for the zone.

A software configurable 'Attack Time' is programmable for each output channel. The Attack Time controls the rate at which the Router can increase the gain when the ambient noise rises. This is to stop the ANS system from suddenly increasing the broadcast volume in response to any short-term increases in ambient noise.

It is possible to configure a particular ANS sensor to control one, or any group of, VAR Router outputs, and it is possible for more than one ANS sensor to be used to control the gain in a single zone.

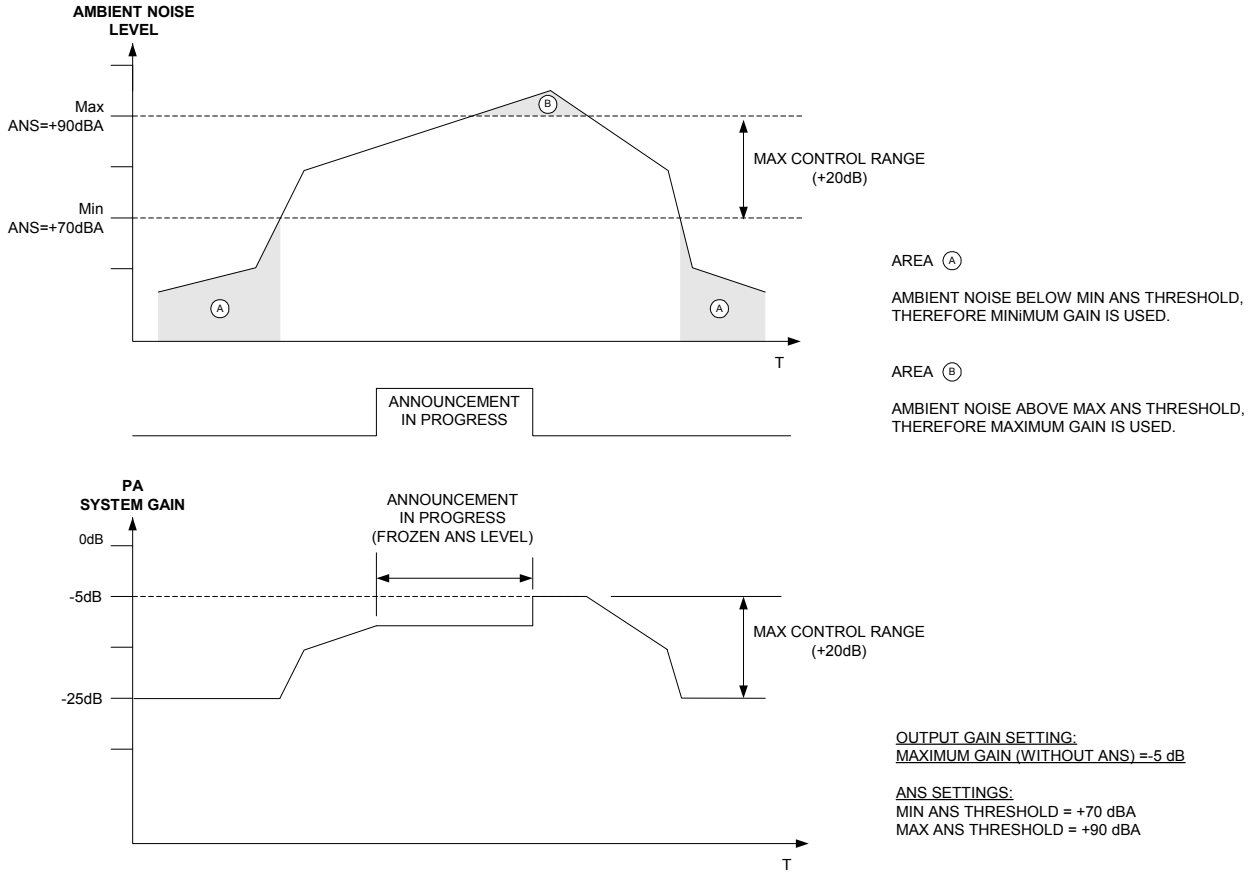
It is possible to assign up to 12 ANS sensors to a single VAR Router output (provided that the sensors are connected to the same BMB01 Remote I/O Unit). Where this is done, the highest of the received ANS values is used, i.e. the maximum volume required by any to the ANS sensors is used.

The ANS system can be set to act on different audio sources in different units. For normal audio sources the ANS level is frozen and does not change during each announcement into a zone. This so that the broadcast itself is not ‘heard’ by the ANS sensors as an increase in the ambient noise level. Without this function the ANS system would cause the broadcast volume to increase during each broadcast. However some input sources can be set to not have the ANS level frozen during broadcast, such as background music. These sources must be set so that their maximum volume is below the maximum ANS threshold (in dBA).

It is possible to disable the ANS function per output channel for system test purposes.

The diagram in Figure 11 illustrates the ANS operation.

Figure 11 ANS Operation



3.9.2 Digital Inputs

Each of the digital inputs may be independently assigned as a Routing Control, Routing Reset or Remote Fault input. Operation is as described in Sections "3.7.3.1 Routing" and "3.7.3.2 External Faults".

If a Latched Route control is set up on an input on a Remote I/O Unit, then the matching Reset Line must be on the same Remote I/O Unit.

3.9.3 Digital Outputs

The digital output is an active-low open-collector output.

The digital outputs may be assigned as 'Busy Outputs'. Each such output may be assigned to correspond to the busy state of any VAR Router output or group of outputs when being driven by any input or group of inputs. In the case of a group of VAR Router outputs, it operates as an OR function of the busy state of the VAR Router outputs, i.e. if any of them are busy with any of the selected inputs then the digital output is driven.

Once an output has been assigned to the 'Busy' function, its open and short circuit fault monitoring is enabled. The VAR Router will log a fault in the event of the output load becoming disconnected, or a short circuit condition being detected at the output. The VAR Router fault report identifies the specific Remote I/O Unit, and the particular digital output channel number affected. It does not differentiate between open and short circuit faults.

3.10 Night Time Volume Control

The VAR Router provides a Night Time Volume Control function. This is a facility for automatically limiting the volume of announcements at configurable times of the day, usually during the night.

The Night Time Volume Control is very flexible, with functions as follows:

- Start and end times individually programmable for each day of the week on a seven day cycle.
- Volume limits individually configurable for each output.
- Application or omission of volume limits individually configurable for each input.

3.11 Test Tone Generation

The VAR Router can synthesise different test tones to assist the commissioning process of the PA/VA system eliminating the need of external tone generators.

These test tones are selectable via the VAR Router control software, and are available as a special input called Test Tone.

The Test Tone input can be routed by activation of a contact, or a button configured for DVA Routing. See Sections "3.7.3.1 Routing" and "3.2.1.1 Paging Microphone Mode", and "3.2.1.2 Zoneable Fire Microphone Mode" for further information on routing mechanisms.

Alternatively the Test Tone can be permanently allocated to specific outputs using a permanent route, see section "3.8 Permanent Routes".

With appropriate priority set-up the Test Tone can be indefinitely routed without compromising microphone and DVA broadcasts. This enables the Test Tone to be provided for the required period of time. This is useful especially when commissioning and testing PA/VA systems installed in large sites.

4 System Controller Functions

4.1 Configuration Mode

This mode is provided to enable an engineer to commission the system.

Access to this mode can only be gained by entering the appropriate access code.

Please refer to the VAR Router Operation Manual for detailed description of the configuration functions.

4.2 Test Mode

The VAR Router can initiate and control a number of unit and system tests:

- all health/fault status indications can be checked by the operation of the Lamp Test function;
- amplifier output can be displayed and monitored audibly by the Audio Mon function;
- changeover/changeback to standby amplifiers can be forced;
- the detailed configuration and operational status of each mainframe and amplifier module can be interrogated.

4.3 Fault Monitor Mode

The mode of operation is fully compliant with BS5839 Pt 8:1998 and BS EN54-2:1998 in the fault types that are displayed and the mode of display.

Active faults, the system fault log, and the frame fault logs can be viewed on the LCD display. Active faults can be accepted and cleared by front panel buttons. The unit communicates with the amplifier mainframes via the Audio-CAN bus for gathering fault status.

4.3.1 Real Time Clock (RTC)

In order to time-stamp the fault reports the VAR Router features a Real Time Clock (RTC). The unit is fitted with an internal Lithium battery to keep this clock running when the power from the VAR Router is turned off.

4.3.2 Fault Indication, Acceptance and Clearance

When the system has no faults present, the unit displays the current time and date on the LCD display and indicates that the system is healthy.

If a fault occurs, then the unit displays text describing the fault. A display of the fault is alternated with a display of the current date and time. In the event of multiple faults each fault is displayed in sequence, while alternating with the date and time display. Faults are time and date stamped as they occur and added to the fault log.

It is possible to separately view a list of all currently active faults. Multiple faults can be examined by scrolling through the list by means of the front panel switches or rotary knob.

When a fault is detected the front panel ‘fault’ LED flashes, and the built-in loudspeaker emits an alarm tone. This tone is compliant in tonal characteristics and SPL with BS5839 Pt 8 (Section 7.3), the indicator flash rate is compliant with BS EN45-2.

The ‘fault’ LED may be steadied and the loudspeaker muted by pressing the front panel FAULT ACCEPT key, or through the user interface’s ‘Faults’ menu.

Newly occurring faults cause the sounder to resume operation and the ‘fault’ LED to resume flashing.

Once a fault is physically fixed it is still latched on the LCD display. It is removed from the latched display by pressing the front panel FAULT CLEAR key, or through the user interface's 'Faults' menu. If a fault cleared in this way still persists, then the fault warning condition will be restored within 100 seconds.

Pressing the clear button releases any active amplifier standby switching to reset the system to a known state.

The unit features a LAMP TEST key. Pressing this switch will cause all indicators on the VAR Router to operate and the fault and health indicators on all mainframes and amplifiers to also illuminate. The built in sounder is also tested.

The user must be logged on to Clear Faults.

4.3.3 Fault Logging

The unit maintains a time-stamped 200 event fault log in non-volatile memory, this include event acceptance and clearance, and user logging in and out times. The non-volatile memory has an endurance of greater than 100,000 cycles.

All faults are logged on separate frame fault logs for frame-specific faults retained by each frame and a single system fault log retained by the VAR Router, which stores all faults (200 events).

To prevent intermittent or frequently recurring faults from rapidly causing excessive write operations to the memory, faults are latched so that a recurring fault is logged in its first instance, and thereafter any repetitions are not recorded, unless a physical manual fault 'clear' has taken place.

The fault log is continuously checked, and, if it is found to be corrupted, it is erased and a new 'LOG CLEARED' fault is logged. A manual fault log clearing function is also provided.

4.3.4 Fault Relays and Remote Fault Outputs

The unit features a fault relay, for indicating system health to external equipment. The relay is normally energised to indicate system health, and de-energised in the event of system fault. If power is removed then a fault is indicated. In addition to the normal relay contacts a second set, fitted with series parallel resistors, is available to allow the connection from the relay to be monitored by external equipment. Both relays are located on the base VAR4 unit Control Port 1. See connection details in Section "6.3.5 Fault Relay Output Wiring Examples".

To allow a remote indication and acceptance of faults, a connector is provided with the necessary inputs and outputs to allow a remote fault panel to be used, see Section "3.7.4 Remote Fault Indication".

4.3.5 Remote Diagnostics

The VAR Router supports a dial-in remote diagnostic interface allowing remote interrogation of fault status from a remote site. Because all parameters are controlled digitally, it is also possible to adjust routing and audio parameters remotely. See the ASL VAR Remote Diagnostics Software manual for details.

4.4 Audio Monitor Mode

The output to any loudspeaker circuit, or any VAR Router audio input or DVA message can be audibly monitored via the front panel loudspeaker and its audio level displayed on the LCD screen.

To achieve monitoring of amplifier outputs, an audio monitor bus 'daisy-chains' around the amplifier modules within the system using pins within the same connectors as the Audio-CAN bus to simplify system wiring. Within the VAR Router this bus can be routed to an audio amplifier and speaker for audible monitoring and via the DSP for level display.

The audio monitoring bus signal relates to the zone output and is fed from the standby amplifier in the event of failure of the main amplifier. Audio monitoring of any standby amplifier always provides a signal relating to its own output.

The amplifier currently being monitored is displayed on the LCD and the VAR Router causes its associated 'select' LED to be illuminated.

The bargraph display is dB relative to 100V for the amplifier outputs and dB relative to digital full scale for VAR Router inputs.

The unit reverts back to Fault Monitor Mode, either by manual selection or if any new faults occur or after a 5-minute time out. Entering the audio monitor mode affects only the LCD display of the unit, i.e. all fault-monitoring activities continue to take place in the background. The status of the LEDs and external outputs are unaffected.

The monitored audio level is adjustable by the rotary encoder. Note that this volume control affects only the monitor audio level and not the level of the alarm sounder which shares the same amplifier and speaker.

4.5 Software Versions

The VAR Router determines and displays its own software version(s) and that of all connected amplifier mainframes and associated surveillance cards.

5 Front Panel

The VAR Router provides a menu-driven interface, and contains keys used to navigate the display menus. The controls and indicators forming this user interface are described in the following sections.

5.1 Indicators

Figure 12 VAR Router LCD Display and LEDs

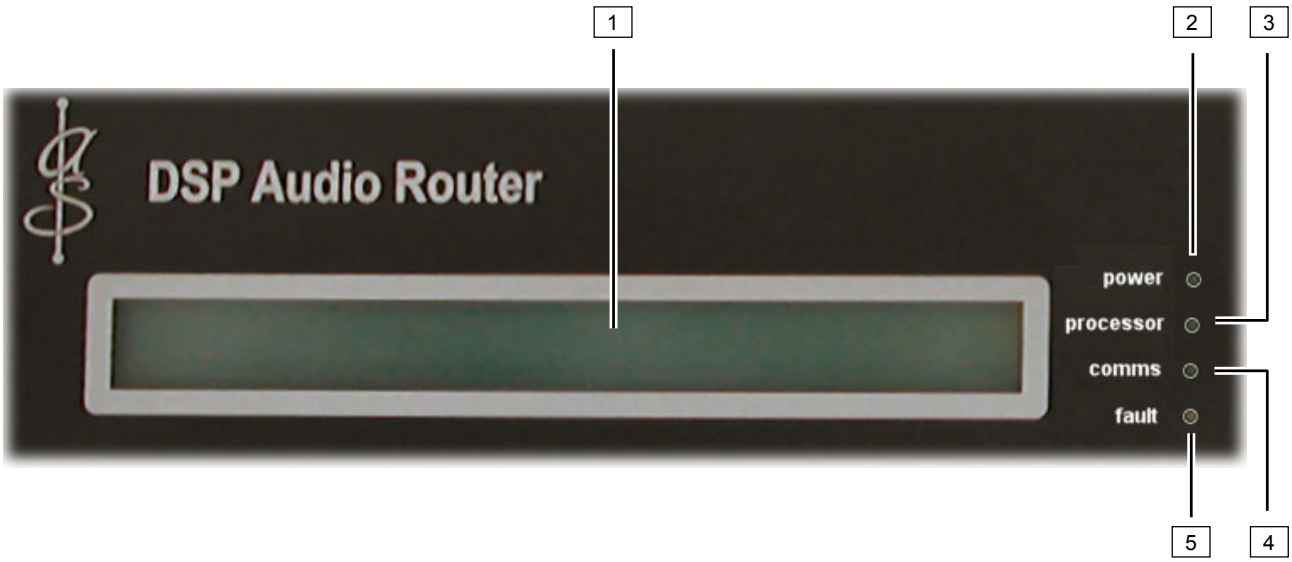


Table 6 VAR Router Front Panel Indicators

Indicators		Description
1	LCD Display	2 x 40 backlit alphanumeric display. Used to display the control menu, faults, and configuration data.
2	power (green LED)	Lit only if the VAR Router is receiving DC power from both sources.
3	processor (green LED)	Flashes to show that the processor is healthy.
4	comms (green LED)	Lit to indicate communication activity between the main processor and the amplifier units. Flashes on receipt of a message from an amplifier unit.
5	fault (amber LED)	Lit to indicate to the VAR Router has detected a system fault. Flashes if a fault has not yet been accepted.

5.2 Controls

The front panel has membrane keys and a rotary encoder for entering commands and making selections, and a monitor loudspeaker.

Figure 13 VAR Router Controls

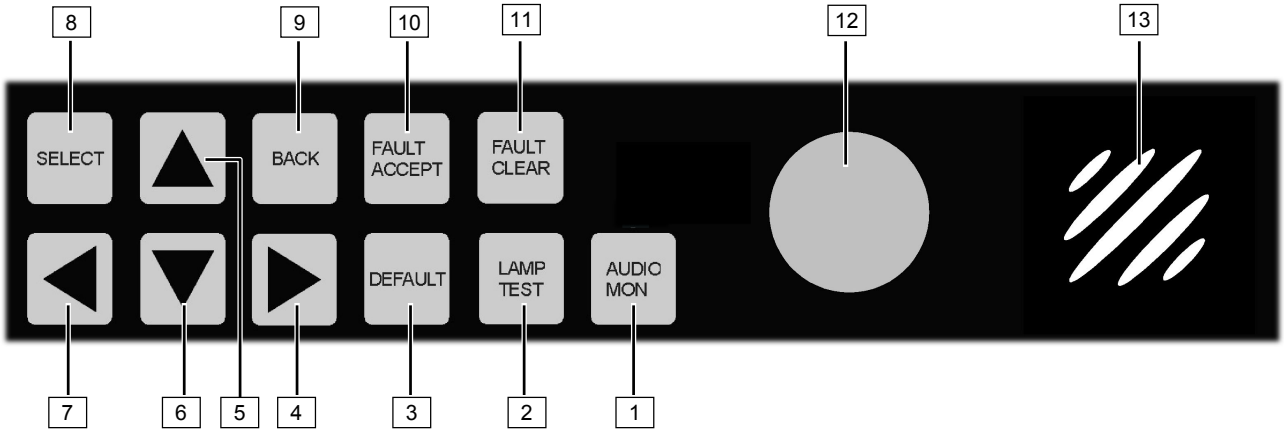


Table 7 VAR Router Front Panel Controls

Indicators		Description
1	AUDIO MON key	Selects Audio Monitor sub-menu on the LCD display.
2	LAMP TEST key	Tests the interface to all connected amplifier units. The fault and select LEDs for each amplifier are turned on, and the audible alarm sounds for 3 seconds. The VAR Router LEDs and sounder are also tested. The display shows 'LAMP + SOUNDER TEST' during this time. This function is also available from the 'Tests' menu.
3	DEFAULT key	Press to clear previously configured text strings quickly during system configuration, or to return fields to their default values.
4 7	▶ key ◀ key	The left and right arrow keys move the item selection in the direction selected, to the next item in the menu. The selected item is indicated by [brackets] around the selection.
5 6	▲ key ▼ key	The up and down arrow keys toggle a selection, or increment a number, or a letter of the alphabet when editing. The rotary encoder acts in the same manner as these keys, and enables faster editing.
8	SELECT key	Press after selecting an item to confirm the selection.
9	BACK key	Press after selecting an item to cancel the selection. If pressed repeatedly, this returns the display to the top-level menu.
10	FAULT ACCEPT key	Accepts all current faults, steadies the flashing fault LED indication, and turns off the audible alarm until a new fault condition occurs.
11	FAULT CLEAR key	Clears all faults and sets all connected equipment to the 'no faults' state, which also cancels any Amplifier Changeovers in effect. If there are any faults present in the system then they are detected anew, and reported again.
12	Rotary Encoder	Multi-function: • For fast increment and decrement of menu items (faster than using ▲ and ▼ arrow keys). • During Audio Monitoring it also acts as a Volume Control.
13	Loudspeaker	Dual function: Alarm Sounder and Audio Monitor

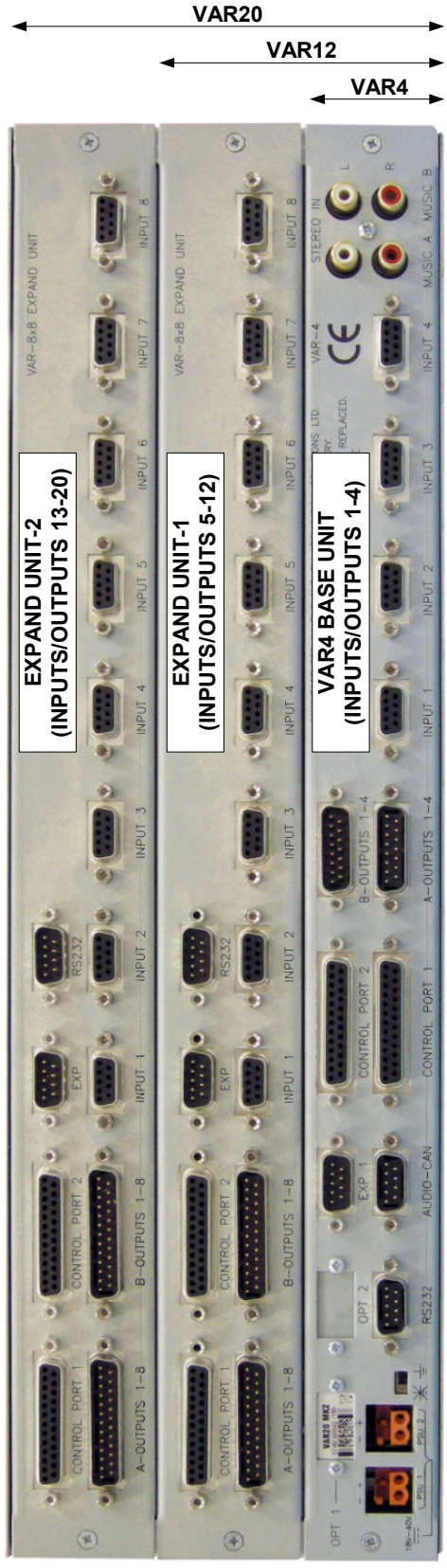
5.3 Screen Timeouts

The LCD backlight is under the control of the processor. The LCD backlight is switched on when any button is pressed, and stays on for 5 minutes after the last key press has occurred. Should a fault occur, the backlight is automatically illuminated.

6 Rear Panel

The diagram in Figure 14 shows the mainframe rear panel connector positions for each VAR Router type.

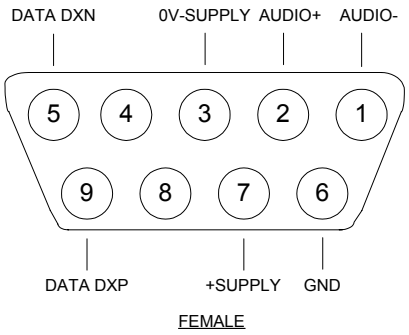
Figure 14 VAR Router Rear Panel



6.1 Audio Inputs

6.1.1 Audio Inputs

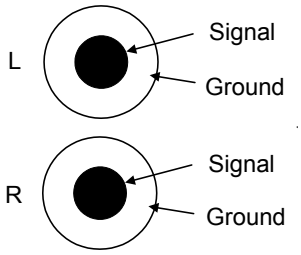
The Audio Input connections are implemented on a 9-way female D connector for each input. Each connector provides balanced audio inputs and dedicated serial data connections for ASL Zoneable Microphones (DMS, FMS, CMB ranges).



Pin No.	Signal	Description
1	AUDIO+	Balanced Audio -
2	AUDIO-	Balanced Audio +
3	0V-SUPPLY	0V Supply
4		Not Connected
5	DATA DXN	Microphone Data – (EIA RS485 19200 baud)
6	GND	Common Ground
7	+SUPPLY	+V Supply
8		Not Connected
9	DATA DXP	Microphone Data + (EIA RS485 19200 baud)

6.1.2 Music A+B

Music A and Music B are unbalanced stereo inputs for background music sources using phono connectors. The stereo signal is mixed to mono internally.

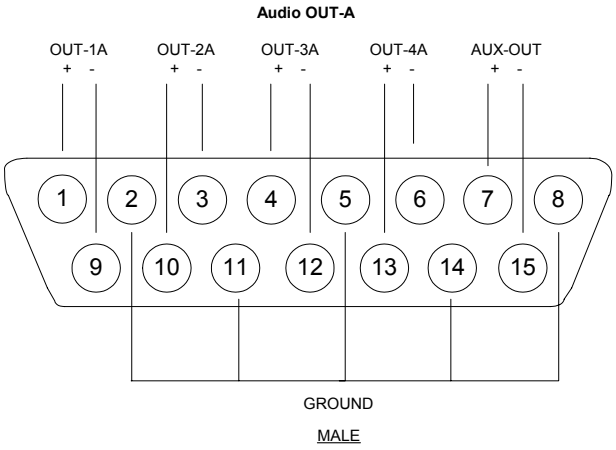


6.2 Audio Outputs

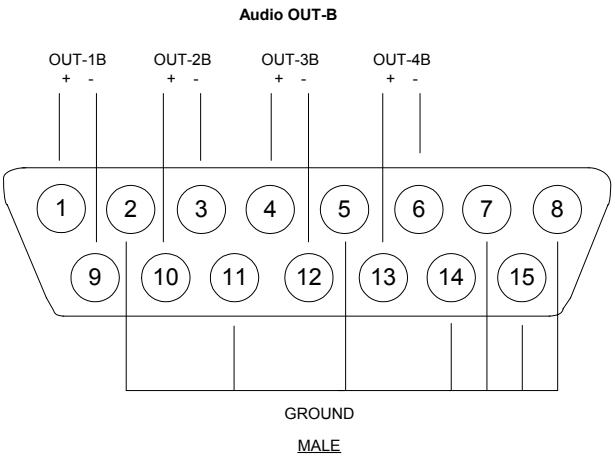
Separate connections are provided for connection to A and B amplifiers for each output. One output is able to sustain a short circuit while leaving the other unaffected.

6.2.1 Base VAR4 Unit

The A+B circuit connections are implemented on 15-way male D connectors as described in the following figures.



Pin No.	Signal	Description
1	OUT-1A+	Balanced Audio Output 1 A +
2	GROUND	Ground
3	OUT-2A-	Balanced Audio Output 2 A -
4	OUT-1A-	Balanced Audio Output 3 A +
5	GROUND	Ground
6	OUT-4A-	Balanced Audio Output 4 A -
7	AUX-OUT+	Auxiliary Output + (Listen-in)
8	GROUND	Ground
9	OUT-1A-	Balanced Audio Output 1 A -
10	OUT-2A+	Balanced Audio Output 2 A +
11	GROUND	Ground
12	OUT-3A-	Balanced Audio Output 3 A -
13	OUT-4A+	Balanced Audio Output 4 A +
14	GROUND	Ground
15	AUX-OUT-	Auxiliary Output - (Listen-in)



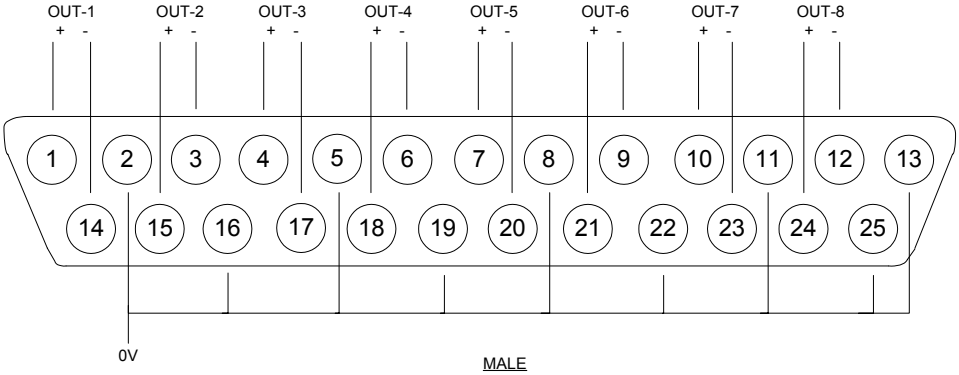
Pin No.	Signal	Description
1	OUT-1B+	Balanced Audio Output 1 B +
2	GROUND	Ground
3	OUT-2B-	Balanced Audio Output 2 B -
4	OUT-3B+	Balanced Audio Output 3 B +
5	GROUND	Ground
6	OUT-4B-	Balanced Audio Output 4 B -
7	GROUND	Ground
8	GROUND	Ground
9	OUT-1B-	Balanced Audio Output 1 B -
10	OUT-2B+	Balanced Audio Output 2 B+
11	GROUND	Ground
12	OUT-3B-	Balanced Audio Output 3 B -
13	OUT4B+	Balanced Audio Output 4 B +
14	GROUND	Ground
15	GROUND	Ground

AUX-OUT is used for 'listen-in' function. See Section "3.2.1.8 'Listen-in' Function on Station Master Console".

6.2.2 Expand Units

The A+B circuit connections are identical and implemented on 25-way male D connectors as described in Figure 15.

Figure 15 Expand Unit Audio Output



Pin No.	Signal	Description
1	OUT-1+	Balanced Audio Output 1 +
2	GROUND	Ground
3	OUT-2-	Balanced Audio Output 2 -
4	OUT-3+	Balanced Audio Output 3 +
5	GROUND	Ground
6	OUT-4-	Balanced Audio Output 4 -
7	OUT-5+	Balanced Audio Output 5 +
8	GROUND	Ground
9	OUT-6-	Balanced Audio Output 6 -
10	OUT-7+	Balanced Audio Output 7 +
11	GROUND	Ground
12	OUT-8-	Balanced Audio Output 8 -
13	GROUND	Ground
14	OUT-1-	Balanced Audio Output 1 -
15	OUT-2+	Balanced Audio Output 2 +
16	GROUND	Ground
17	OUT-3-	Balanced Audio Output 3 -
18	OUT-4+	Balanced Audio Output 4 +
19	GROUND	Ground
20	OUT-5-	Balanced Audio Output 5 -
21	OUT-6+	Balanced Audio Output 6 +
22	GROUND	Ground
23	OUT-7-	Balanced Audio Output 7 -
24	OUT-8+	Balanced Audio Output 8 +
25	GROUND	Ground

6.3 Control Ports

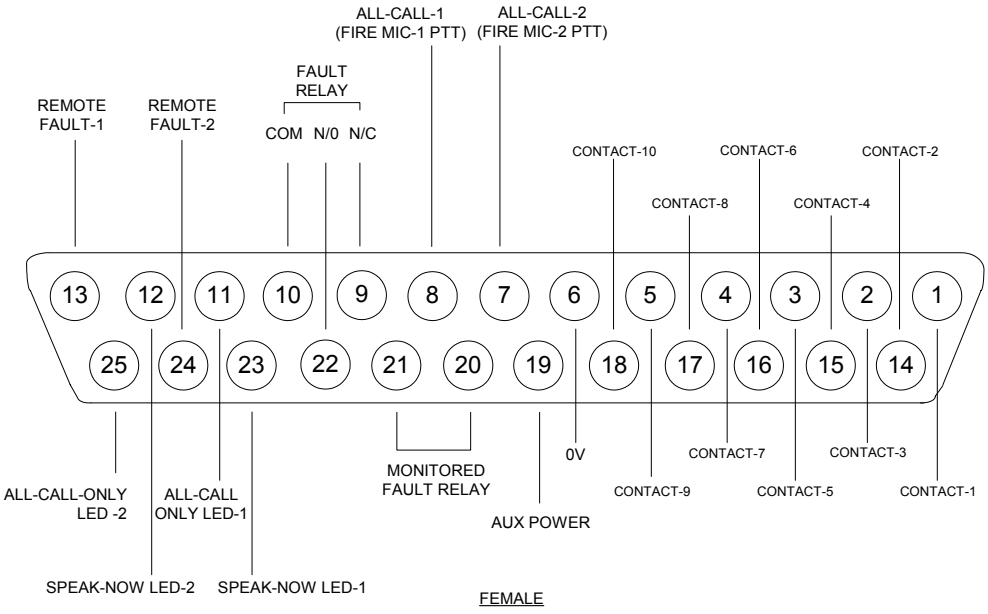
6.3.1 Control Port 1 (Base VAR4 Unit)

In addition to the analogue contacts, base VAR4 unit Control Port 1 accommodates the Fire Microphone interface, Fault Relay outputs, and Remote Fault outputs on a 25-way female D connector.

Section "6.3.6.1 Fire Microphone Wiring Examples" shows examples of connections to this port for interfacing the Fire Microphones.

Section "6.3.6.2 Fault Relay Output Wiring Examples" shows the connections to the Fault Relay outputs on this port.

Figure 16 Base VAR4 Unit Control Port 1

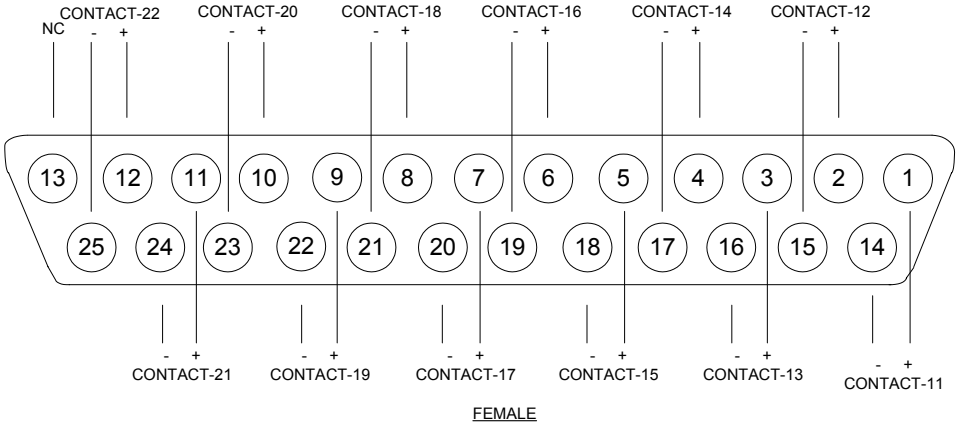


Pin No.	Signal	Description
1	CONTACT-1	Analogue Contact 1, internally pulled up to 5 V
2	CONTACT-3	Analogue Contact 3, internally pulled up to 5 V
3	CONTACT-5	Analogue Contact 5, internally pulled up to 5 V
4	CONTACT-7	Analogue Contact 7, internally pulled up to 5 V
5	CONTACT-9	Analogue Contact 9, internally pulled up to 5 V
6	0V	0V
7	ALL-CALL-2 (FIRE MIC-2 PTT)	Input 2 Fire Microphone All-Call PTT
8	ALL-CALL-1 (FIRE MIC-1 PTT)	Input 1 Fire Microphone All-Call PTT
9	N/C	Fault Relay N/C Contact
10	COM	Fault Relay Common Contact
11	ALL-CALL-ONLY LED-1	Input 1 Fire Microphone All-Call-Only LED
12	ALL-CALL-ONLY LED-2	Input 2 Fire Microphone All-Call-Only LED
13	REMOTE FAULT-1	Remote Fault Output 1 (open collector)
14	CONTACT-2	Analogue Contact 2, internally pulled up to 5 V
15	CONTACT-4	Analogue Contact 4, internally pulled up to 5 V
16	CONTACT-6	Analogue Contact 6, internally pulled up to 5 V
17	CONTACT-8	Analogue Contact 8, internally pulled up to 5 V
18	CONTACT-10	Analogue Contact 10, internally pulled up to 5 V
19	AUX POWER	Auxiliary Power Supply (18-36 V DC, fused at 100 mA)
20	MONITORED FAULT RELAY	Monitored Fault Relay Contact
21	MONITORED FAULT RELAY	Monitored Fault Relay Contact
22	N/O	Fault Relay N/O Contact
23	SPEAK-NOW LED-1	Input 1 Fire Microphone Speak Now LED
24	REMOTE FAULT-2	Remote Fault Output 2 (open collector)
25	SPEAK-NOW LED-2	Input 2 Fire Microphone All-Call-Only LED

6.3.2 Control Port 2 (Base VAR4 Unit)

Base VAR4 unit Control Port 2 implements opto-isolated contacts on a 25-way female D connector.

Figure 17 Base VAR4 Unit Control Port 2



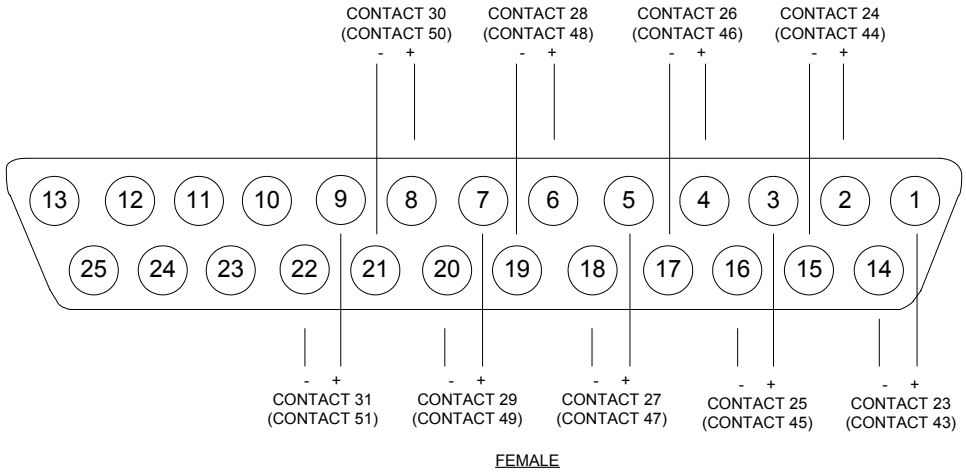
Pin No.	Signal	Description
1	CONTACT-11+	Opto-isolated Contact 11 +VE
2	CONTACT-12+	Opto-isolated Contact 12 +VE
3	CONTACT-13+	Opto-isolated Contact 13 +VE
4	CONTACT-14+	Opto-isolated Contact 14 +VE
5	CONTACT-15+	Opto-isolated Contact 15 +VE
6	CONTACT-16+	Opto-isolated Contact 16 +VE
7	CONTACT-17+	Opto-isolated Contact 17 +VE
8	CONTACT-18+	Opto-isolated Contact 18 +VE
9	CONTACT-19+	Opto-isolated Contact 19 +VE
10	CONTACT-20+	Opto-isolated Contact 20 +VE
11	CONTACT-21+	Opto-isolated Contact 21 +VE
12	CONTACT-22+	Opto-isolated Contact 22 +VE
13	NC	Not Connected
14	CONTACT-11-	Opto-isolated Contact 11 -VE
15	CONTACT-12-	Opto-isolated Contact 12 -VE
16	CONTACT-13-	Opto-isolated Contact 13 -VE
17	CONTACT-14-	Opto-isolated Contact 14 -VE
18	CONTACT-15-	Opto-isolated Contact 15 -VE
19	CONTACT-16-	Opto-isolated Contact 16 -VE
20	CONTACT-17-	Opto-isolated Contact 17 -VE
21	CONTACT-18-	Opto-isolated Contact 18 -VE
22	CONTACT-19-	Opto-isolated Contact 19 -VE
23	CONTACT-20-	Opto-isolated Contact 20 -VE
24	CONTACT-21-	Opto-isolated Contact 21 -VE
25	CONTACT-22-	Opto-isolated Contact 22 -VE

6.3.3 Control Port 1 (Expand Unit)

Expand unit Control Port 1 implements opto-isolated contacts on a 25-way female D connector.

The contact numbers in brackets refer to the upper expand unit (VAR20 only). The contacts numbers without brackets refer to the lower expand units (VAR12 and VAR20)

Figure 18 Expand Unit Control Port 1



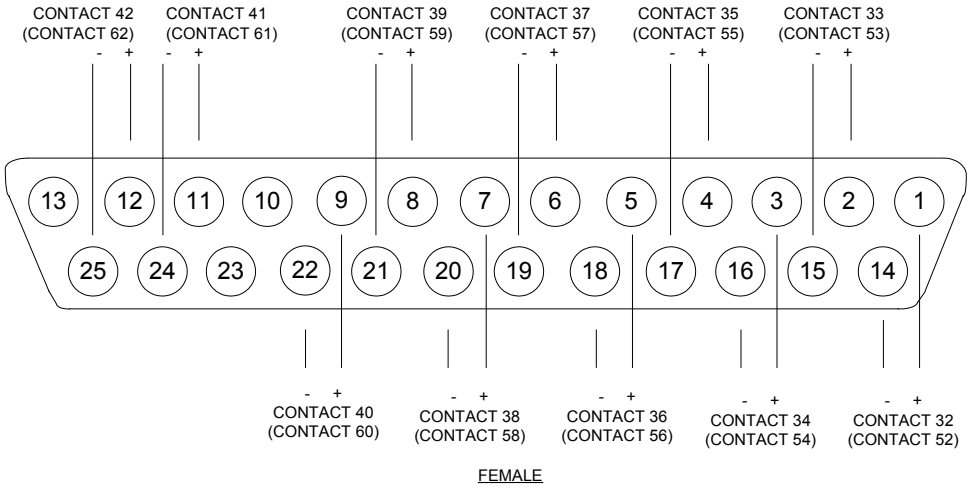
Pin No.	Signal	Description
1	CONTACT 23 (CONTACT 43) +	Opto-isolated Contact 23(43) +VE
2	CONTACT 24 (CONTACT 44) +	Opto-isolated Contact 24(44) +VE
3	CONTACT 25 (CONTACT 45) +	Opto-isolated Contact 25(45) +VE
4	CONTACT 26 (CONTACT 46) +	Opto-isolated Contact 26(46) +VE
5	CONTACT 27 (CONTACT 47) +	Opto-isolated Contact 27(47) +VE
6	CONTACT 28 (CONTACT 48) +	Opto-isolated Contact 28(48) +VE
7	CONTACT 29 (CONTACT 49) +	Opto-isolated Contact 29(49) +VE
8	CONTACT 30 (CONTACT 50) +	Opto-isolated Contact 30(50) +VE
9	CONTACT 31 (CONTACT 51) +	Opto-isolated Contact 31(51) +VE
10		Not Connected
11		Not Connected
12		Not Connected
13		Not Connected
14	CONTACT 23 (CONTACT 43) -	Opto-isolated Contact 23(43) -VE
15	CONTACT 24 (CONTACT 44) -	Opto-isolated Contact 24(44) -VE
16	CONTACT 25 (CONTACT 45) -	Opto-isolated Contact 25(45) -VE
17	CONTACT 26 (CONTACT 46) -	Opto-isolated Contact 26(46) -VE
18	CONTACT 27 (CONTACT 47) -	Opto-isolated Contact 27(47) -VE
19	CONTACT 28 (CONTACT 48) -	Opto-isolated Contact 28(48) -VE
20	CONTACT 29 (CONTACT 49) -	Opto-isolated Contact 29(49) -VE
21	CONTACT 30 (CONTACT 50) -	Opto-isolated Contact 30(50) -VE
22	CONTACT 31 (CONTACT 51) -	Opto-isolated Contact 31(51) -VE
23		Not Connected
24		Not Connected
25		Not Connected

6.3.4 Control Port 2 (Expand Unit)

Expand unit Control Port 1 implements opto-isolated contacts on a 25-way female D connector.

The contact numbers in brackets refer to the upper expand unit (VAR20 only). The contacts numbers without brackets refer to the lower expand units (VAR12 and VAR20)

Figure 19 Expand Unit Control Port 2



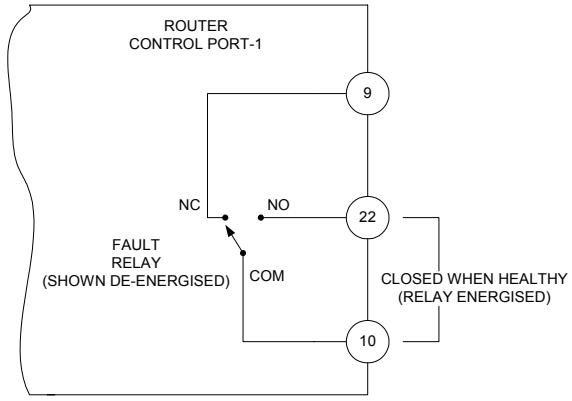
Pin No.	Signal	Description
1	CONTACT 32 (CONTACT 52) +	Opto-isolated Contact 32(52) +VE
2	CONTACT 33 (CONTACT 53) +	Opto-isolated Contact 33(53) +VE
3	CONTACT 34 (CONTACT 54) +	Opto-isolated Contact 34(54) +VE
4	CONTACT 35 (CONTACT 55) +	Opto-isolated Contact 35(55) +VE
5	CONTACT 36 (CONTACT 56) +	Opto-isolated Contact 36(56) +VE
6	CONTACT 37 (CONTACT 57) +	Opto-isolated Contact 37(57) +VE
7	CONTACT 38 (CONTACT 58) +	Opto-isolated Contact 38(58) +VE
8	CONTACT 39 (CONTACT 59) +	Opto-isolated Contact 39(59) +VE
9	CONTACT 40 (CONTACT 60) +	Opto-isolated Contact 40(60) +VE
10		Not Connected
11	CONTACT 41 (CONTACT 61) +	Opto-isolated Contact 41(61) +VE
12	CONTACT 42 (CONTACT 62) +	Opto-isolated Contact 42(62) +VE
13		Not Connected
14	CONTACT 32 (CONTACT 52) -	Opto-isolated Contact 32(52) -VE
15	CONTACT 33 (CONTACT 53) -	Opto-isolated Contact 33(53) -VE
16	CONTACT 34 (CONTACT 54) -	Opto-isolated Contact 34(54) -VE
17	CONTACT 35 (CONTACT 55) -	Opto-isolated Contact 35(55) -VE
18	CONTACT 36 (CONTACT 56) -	Opto-isolated Contact 36(56) -VE
19	CONTACT 37 (CONTACT 57) -	Opto-isolated Contact 37(57) -VE
20	CONTACT 38 (CONTACT 58) -	Opto-isolated Contact 38(58) -VE
21	CONTACT 39 (CONTACT 59) -	Opto-isolated Contact 39(59) -VE
22	CONTACT 40 (CONTACT 60) -	Opto-isolated Contact 40(60) -VE
23		Not Connected
24	CONTACT 41 (CONTACT 61) -	Opto-isolated Contact 41(61) -VE
25	CONTACT 42 (CONTACT 62) -	Opto-isolated Contact 42(62) -VE

6.3.5 Fault Relay Output Wiring Examples

Control Port-1 on the base VAR4 unit has two types of global fault outputs; a changeover relay contact and a set of relay contacts with resistors suitable for use in a monitored circuit such as that provided with Fire Panels.

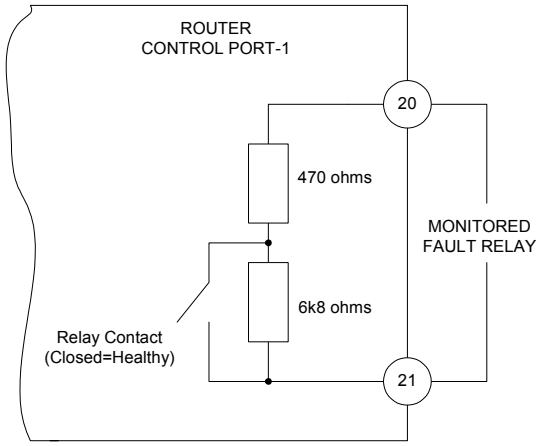
The diagram in Figure 20 shows the changeover fault relay internal detail.

Figure 20 Fault Relay Output



The diagram in Figure 21 illustrates the monitored fault relay internal detail.

Figure 21 Monitored Fault Relay Output

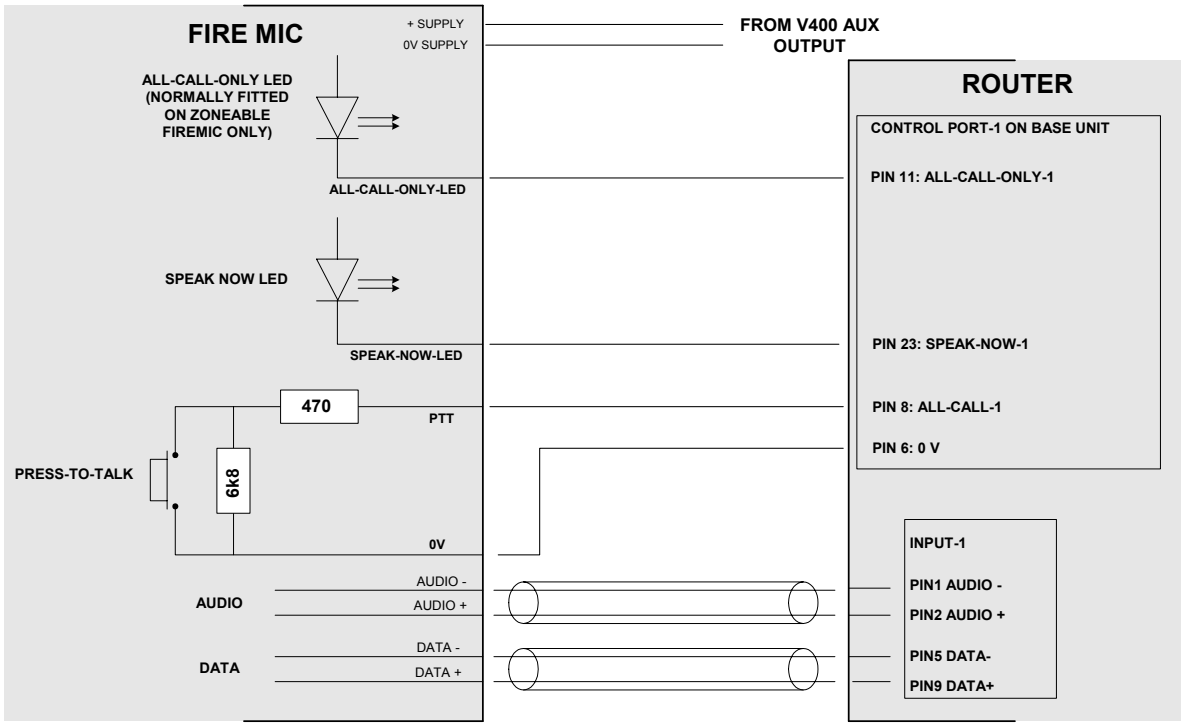


6.3.6 Fire Microphone Wiring Examples

6.3.6.1 Fire Microphone on Input 1

> The LEDs must have suitable series resistors fitted; these are fitted as standard within the ASL FMS range of product.

Figure 22 Fire Microphone Connections to Input 1

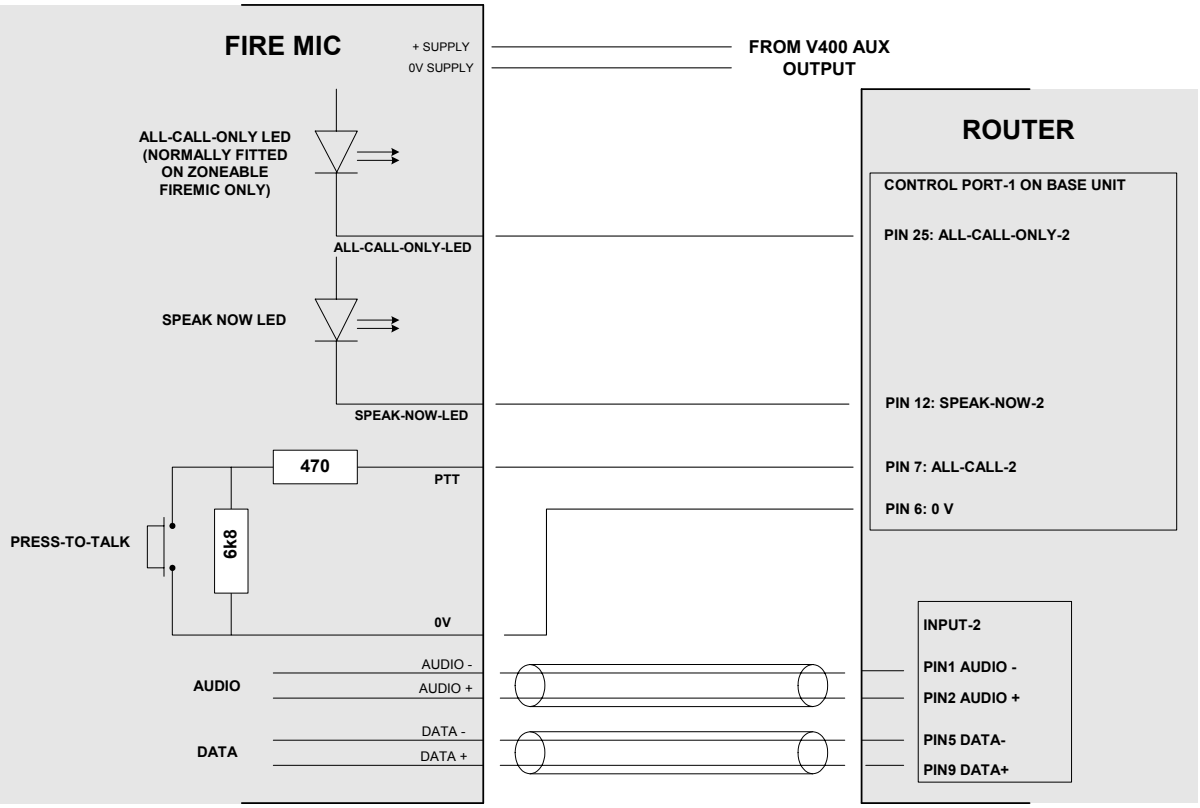


FIRE MIC CONNECTIONS: INPUT 1

6.3.6.2 Fire Microphone on Input 2

> The LEDs must have suitable series resistors fitted; these are fitted as standard within the ASL FMS range of product.

Figure 23 Fire Microphone Connections to Input 2



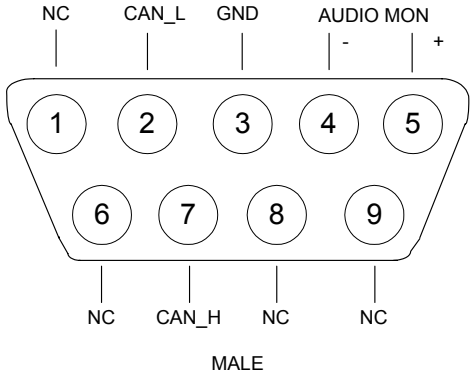
FIRE MIC CONNECTIONS: INPUT 2

6.4 Serial Ports

6.4.1 Audio-CAN

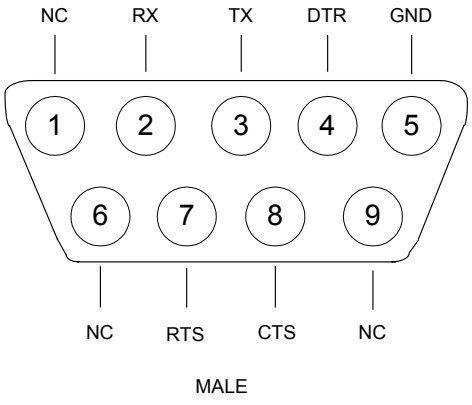
The Audio-CAN port is a 9-way male D connector for connection to the system Audio-CAN bus that provides digital communication between the VAR Router, amplifier mainframes, and their associated amplifier modules and interface cards.

An audio monitor bus 'daisy-chains' around the amplifier modules within the system using pins within the same connectors as the Audio-CAN bus to simplify system wiring. The VAR Router can select an amplifier output to connect to this bus and the audio level is displayed on the LCD as well as being audible in the VAR Router loudspeaker.



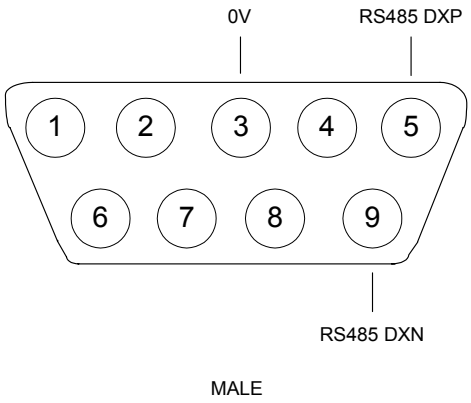
Pin No.	Signal	Description
1	NC	Not Connected
2	CAN_L	CAN Bus Dominant Low
3	GND	Common Ground
4	AUDIO MON -	Audio Monitor -
5	AUDIO MON +	Audio Monitor +
6	NC	Not Connected
7	CAN_H	CAN Bus Dominant High
8	NC	Not Connected
9	NC	Not Connected

6.4.2 RS232 Port



Pin No.	Signal	Signal
1	NC	Not Connected
2	RX	EIA RS232 Received Data (9600 baud)
3	TX	EIA RS232 Transmitted Data (9600 baud)
4	DTR	EIA RS232 Data Terminal Ready
5	GND	EIA RS232 Common Ground
6	NC	Not Connected
7	RTS	EIA RS232 Request To Send
8	CTS	EIA RS232 Clear To Send
9	NC	Not Connected

6.4.3 RS485 Port (EXP)



Pin No.	Signal	Description
1		Reserved
2		Reserved
3	0V	Ground
4		Reserved
5	RS485 DXP	RS485 Communication Data + (9600 baud)
6		Reserved
7		Reserved
8		Reserved
9	RS485 DXN	RS485 Communication Data – (9600 baud)

Other unused pins on this connector are for future expansion.

DO NOT MAKE CONNECTIONS TO THEM.

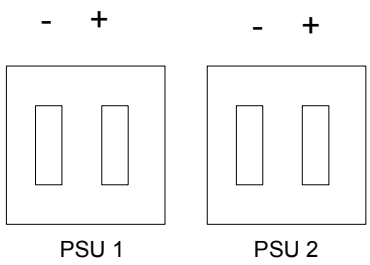
6.5 DC Supplies (PSU1, PSU2)

VAR Router requires 18-40 V DC supply.

PSU1 should come from a V400 Amplifier Mainframe AUX DC SUPPLY OUT terminations. Where possible, two mainframe outputs may be paralleled to feed PSU1 (one from each of two different mainframes) to provide a measure of current sharing and redundancy.

PSU2 should come directly from the battery via a fuse or breaker adequate to protect the cable from the potentially dangerous short circuit currents associated with SLA batteries. The ASL BDIST-2A product provides this function.

Figure 24 PSU Connectors



7 Product Specification

Audio Routing

VAR4

Universal Mic/Line audio inputs with serial control, surveillance tone, and phantom power 4
Audio outputs with surveillance tone ..... 4 (Separate A and B outputs for each)
Built-in DVA storage ..... 4 (2 x 32-second & 2 x 16-second)

VAR12

Universal Mic/Line audio inputs with serial control, surveillance tone, and phantom power 12
Audio outputs with surveillance tone ..... 12 (Separate A and B outputs for each)
Built-in DVA storage ..... 8 (4 x 32-second & 4 x 16-second)

VAR20

Universal Mic/Line audio inputs with serial control, surveillance tone, and phantom power 20
Audio outputs with surveillance tone ..... 20 (Separate A and B outputs for each)
Built-in DVA storage ..... 12 (6 x 32-second & 6 x 16-second)

All Variants

Hardware bypass Fire Microphone inputs ..... 2 (Universal Mic/Line Inputs 1 & 2)
Background music line audio inputs ..... 2 * Stereo pairs (Internally mixed)
Mixed listen-in monitoring audio output 1
Number of concurrent host routes ..... 100 (max.)
Override per output ..... 40 (max.)

General

VAR4

Analogue input interfaces 10
Opto-isolated digital control / Fault / Routing / Fire Alarm Panel input interfaces 12
Remote I/O Unit (BMB01) interfaces 3

VAR12

Analogue input interfaces 10
Opto-isolated digital control / Fault / Routing / Fire Alarm Panel input interfaces 32
Remote I/O Unit (BMB01) interfaces 6

VAR20

Analogue input interfaces 10
Opto-isolated digital control / Fault / Routing / Fire Alarm Panel input interfaces 52
Remote I/O Unit (BMB01) interfaces 9

All Variants

Supply Voltage Range ..... 18 to 40 V DC
Control / Fault reporting display and button interface ..... On front panel
Fault log ..... 200 events
Real Time Clock ..... Built-in (Externally synchronisable)
Remote Diagnostics / Control / PC/DVA interface 1 (RS232)
Auxiliary DC supply for external equipment ..... 18 – 36 V DC @ 100 mA
Changeover fault relays ..... 2 (One monitored)
Maximum external fault active-low input voltage threshold ..... 2.5 V
Maximum global-fault relay contact current rating ..... 500 mA
Open collector drive (SPEAK NOW LED, ALL CALL LED, REMOTE FAULT OUTPUTS) ..... 100 mA

Audio Signal Processing

Input

Sensitivity and impedance
- Line ..... −20 dBu (77 mV) @ Z ≥10 kΩ
- Mic ..... 770 μV @ Z ≥10 kΩ
- Music (phono) ..... Suits 1-2 V RMS units Z ≥5 kΩ

Equalisation ..... 3 band plus LF Cut
Input overload margin ..... 40 dB
Input attenuator range ..... 0 – 63 dB
Phantom power ..... ≥12 V DC
Surveillance tone ..... 20 – 30 Hz
Required level 0 to −40 dBFS
Chime generation ..... None / 1 / 2 / 3 Chimes

Output

Gain control range ..... 0 dB to −63 dB
Graphic equalisation ..... 8 band
±12 dB @ 125, 250, 500, 1 k, 2 k, 4 k, 8 k, 16 kHz
Level and impedance ..... 0 dBu @ Z=660 Ω
Hard limiter threshold ..... +2.5 dBu
Surveillance tone ..... 10 dBu to −30 dBu 30 Hz
Pulsed mode=1 s on 20 s off
Number of induction loop driven
- VAR4 ..... up to 2
- VAR12 ..... up to 4
- VAR20 ..... up to 6

General

Test tones ..... Speech Shaped / White Noise / Pink Noise /Sine Wave
Gain control ..... Input / Output / External volume control
Ambient noise sensing ..... Programmable output level control
Night volume control ..... Daily time controlled input / Output level control
Gain control range ..... 0 dB to −63 dB
THD input to output ..... <0.1% @1 kHz
Crosstalk ..... >70 dB @1 kHz
Residual noise ..... <78 dBu (A)
S/N line ..... >70 dB (A)
S/N mic ..... >60 dB (A)
Frequency response (input to output) ..... 100 Hz to 20 kHz −3 dB

Analogue Contact Thresholds

Status

Faulty: Open Circuit ..... >3.7 V
Healthy: Inactive ..... 2.5 V – 3.7 V
Indeterminate ..... 0.8 V – 2.5 V
Healthy: Active ..... 0.3 V – 0.8 V
Faulty: Short Circuit ..... <0.3 V

Current Consumption

VAR4

Backlight on and sounder on ..... 400 mA @ 24 V DC supply
Backlight off and sounder off ..... 350 mA @ 24 V DC supply

VAR12

Backlight on and sounder on ..... 1.1 A @ 24 V DC supply
Backlight off and sounder off ..... 1 A @ 24 V DC supply

VAR20

Backlight on and sounder on ..... 1.6 A @ 24 V DC supply
Backlight off and sounder off ..... 1.5 A @ 24 V DC supply

Dimensions and Weight

VAR4

Dimensions (H x W x D) ..... 44 mm x 436 mm x 222 mm (excl. connectors)
Weight ..... 2.2 kg

VAR12 and VAR20

Dimensions (H x W x D) ..... 133 mm x 436 mm x 222 mm (excl. connectors)
Weight ..... 6.0 kg

Environmental

Temperature (storage and operating) ..... −5 °C to +50 °C
Humidity range ..... 0% to 93% Non-condensing

Safety and EMC

EMC EN55103-1/E1, EN55103-2/E5, EN50121-4, ENV50204
Safety EN60065

8 Mechanical Dimensions

Figure 25 VAR4 Mechanical Dimensions

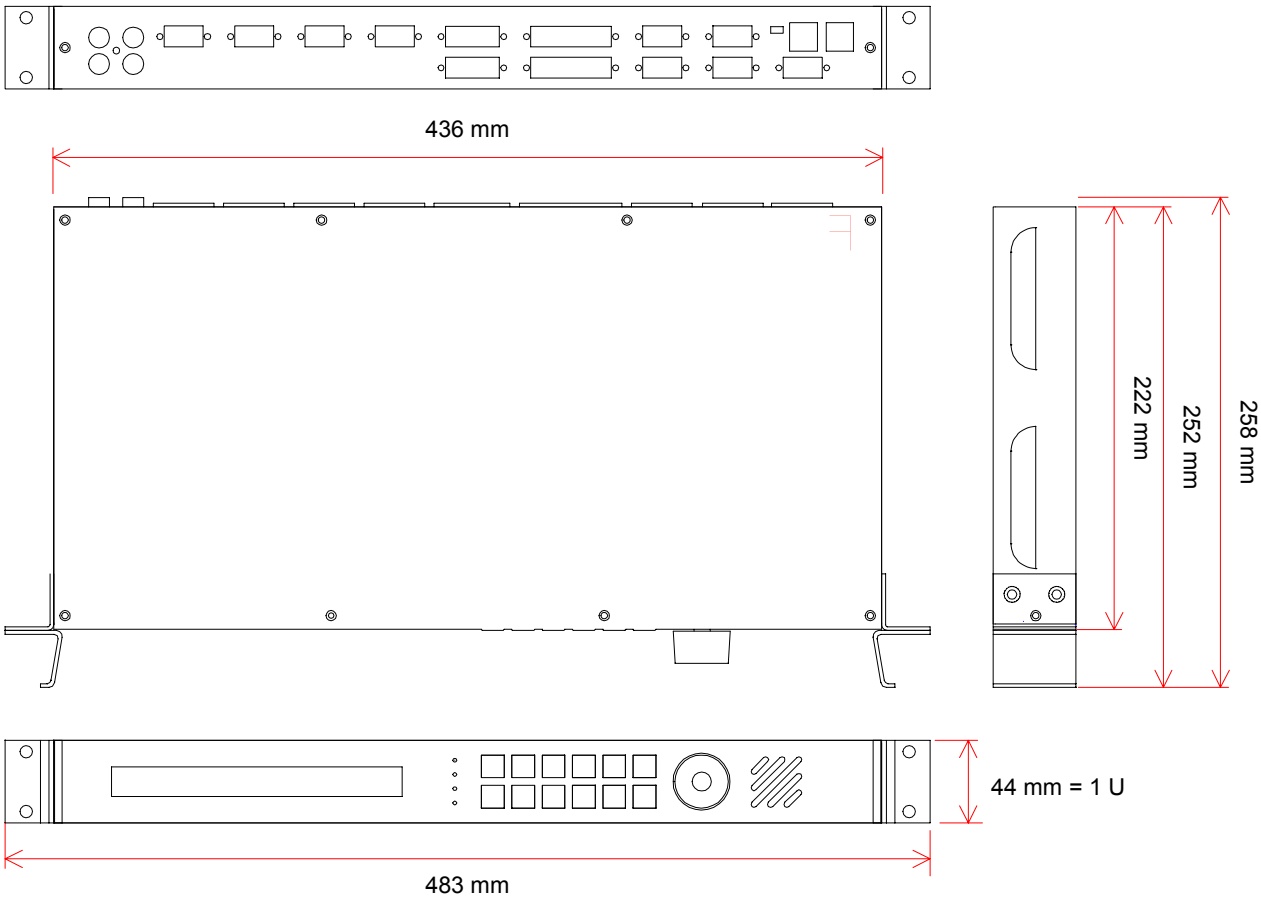
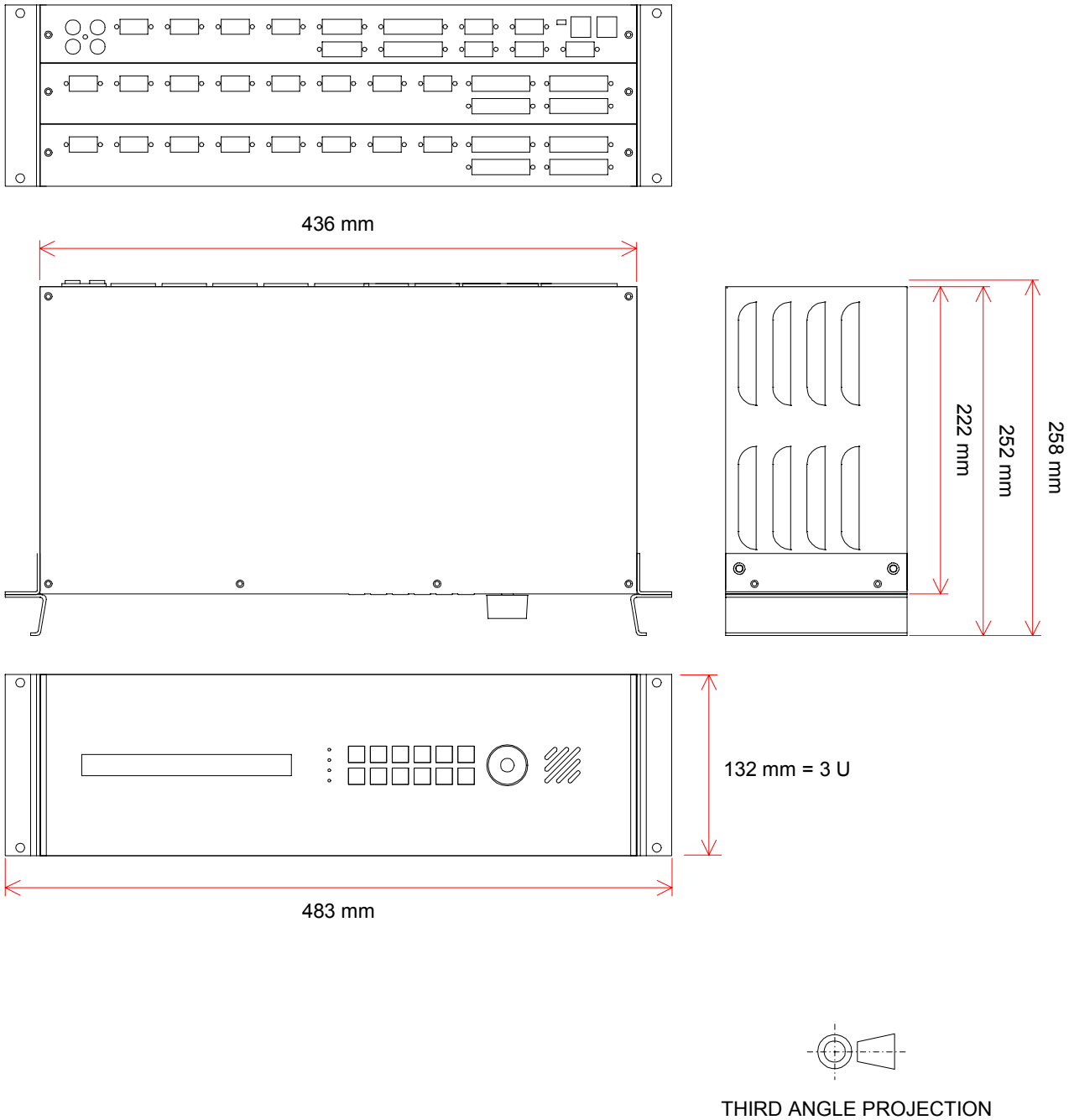


Figure 26 VAR12 and VAR20 Mechanical Dimensions



9 Reference Documents

Additional reference information may be found in the following documentation, available from the “Data Downloads” page of Application Solutions website: www.asl-electronics.co.uk

Table 8 Reference Documents

Ref. No	Title	Filename Ref	Origin
1	VAR4/VAR12/VAR20 Product Description (this document)	U-0450-1227	ASL
2	VAR4/VAR12/VAR20 Operation Guide	U-0450-1405	ASL
3	VAR4 Installation Guide	450_VAR-4_Guide	ASL
4	VAR12/VAR20 Installation Guide	450_VAR-12.20 Guide	ASL
5	VAR-NIA Product Manual	U-0450-1252	ASL
6	VAR8-ACU Product Description	U-0450-1431	ASL
7	Intellevac Product Description	U-0518-0859	ASL
8	DMS5/10 Digital Microphone Stations Technical Installation Guide	464_dms_guide	ASL
9	DMS20 Digital Microphone Stations Technical Installation Guide	U-0464-0224	ASL
10	FMS1 All-Call Fireman’s Microphone Technical Installation Guide	464_FMS1_Guide	ASL
11	FMS5/10/20 Zoneable Fireman’s Microphones Technical Installation Guide	464_FMS5_10_20_Guide	ASL
12	ANS01 Ambient Noise Sensor Technical Installation Guide	511_ans01_guide	ASL
13	ANS03 Ambient Noise Sensor Technical Installation Guide	511_ANS03_Guide	ASL
14	BMB01 Router I/O Unit	450_bmb01_guide	ASL
15	Remote Volume Controls and Programme Selectors	450_VCPS_Guide	ASL

10 Abbreviations

AC	Alternating Current
ACU	Audio Control Unit
ANS	Ambient Noise Sensor
ASL	Application Solutions Limited
BDIST	Battery Distribution Unit
BMB01	Remote I/O Unit
CAN	Controller Area Network
CPU	Central Processing Unit
DC	Direct Current
DIP	Dual In-line Package
DMS	Digital Microphone Station
DSP	Digital Signal Processing
DVA	Digital Voice Announcer (Messages)
EEPROM	Electrically Erasable Programmable Read-Only Memory
EAP	Emergency Announcement Point
EIA	Electronic Industries Alliance
EMC	Electromagnetic Compatibility
FMS	Fireman Microphone Station
LCD	Liquid Crystal Display
LED	Light Emitting Diode
PSU	Power Supply Unit
PTT	Press To Talk
RTC	Real Time Clock
SAP	Station Announcement Point
SLA	Sealed Lead Acid
SMC	Station Master Console
VAR	Voice Alarm Router
VAR-NIA	VAR Network Interface Adapter

11 Index

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Service and Warranty

Name and Address of Authorised Distributor:

This product carries a full warranty. For full details of warranty and service agreements, please contact the Authorised Distributor who supplied the product to you.

Exclusions

The warranty does NOT cover:

1. Customer misuse, including incorrect installation.
2. Damage other than manufacturing defects.
3. Transit / Courier damage.
4. Incorrect voltage or power supply used.
5. Incorrect input signal.
6. Abnormal environmental operating conditions.
7. Damage incurred by accident, fire, lightning or other hazard.
8. Modification to the unit or inexpert / attempted repair.
9. No fault found – where no fault can be found after extensive testing, indicating user error or failure in ancillary equipment.
10. Electronic assemblies which are improperly packed when returned for repair or service. All electronics assemblies must be properly packed in ESD protective packing for transport to prevent physical and ESD damage. Use of non-ESD protective packing for return for repair or service will automatically invalidate the warranty.

Should any of the above apply, Application Solutions Limited reserves the right to raise any relevant charges to the customer.

Application Solutions Limited shall not be liable for any indirect, special or consequential loss or damage (including without limitation any loss of profits) arising from the use of this product or for any breach of this warranty.

In the interest of continual product development, Application Solutions Limited reserves the right to make changes to product specification without notice or liability.


ASL
safety, security & control